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CHICAGO

W. J. Finck

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SURGICAL CLINICS OF CHICAGO**Volume 4****Number 2****CLINIC OF DR A J OCHSNER****AUGUSTANA HOSPITAL****PROSTATECTOMY**

Summary Perineal prostatectomy by the two-stage operation details of the technique of preparing the patient of operative procedure and of postoperative management

THE patient on whom we shall operate this morning is a man seventy seven years of age His past history is practically negative except for an attack of bilious fever seventeen years ago A right-sided inguinal hernia developed two or three years ago a truss keeps it up fairly well

Two years ago he had acute stoppage of urine He was catheterized at the time and for about a month following the attack after which time the function of the bladder partly returned so that he could get along though the stream was slow and the act was followed by dribbling He has had no incontinence and no hematuria There has been no pain in the lower abdomen There has been slight pain along the urethra Five days ago he had another attack of acute stoppage of urine for which he has been catheterized once a day since

Physical Examination—The patient is a robust looking well nourished large individual seventy seven years of age well preserved with gray beard and hair

Examination of the head neck chest abdomen and extremities is negative

The bladder is distended to a point well below the umbilicus and the prostate is enlarged to approximately eight times the normal size A soft rubber tipped catheter No 8 French can be passed without pain

The urine is practically normal

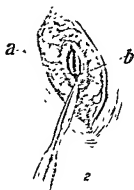
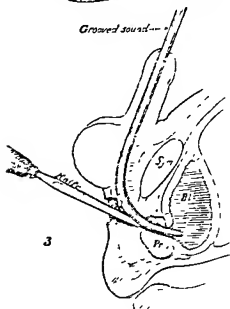
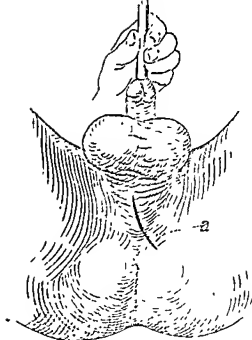
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Treatment—The patient was given 5 grains of urotropin dissolved in 8 ounces of distilled water every three hours for two days. The bladder was catheterized and irrigated for one-half hour daily with 1 : 4000 solution of permanganate of potash. The patient was given 2 ounces of castor oil on the day before operation and a large soapsuds enema on the evening before and the morning of the operation. One-half hour before the anesthetic was started he was given $\frac{1}{4}$ grain of morphin and $\frac{1}{100}$ grain of atropin.

The patient was anesthetized with ether by the drop method and when completely under the influence, a catheter was passed and the bladder was irrigated with a solution of 1 : 4000 permanganate of potash, 500 c c of this fluid was permitted to remain in the bladder. An incision was made directly above the pubic bone 3 cm in length, down to the bladder. The bleeding vessels were all clamped and ligated at once. Then two catgut sutures were carried through the wall of the bladder directly above the pubes each $\frac{1}{2}$ cm to the side of the midline, leaving a sufficient space between for making an incision 1 cm in length in the anterior wall of the bladder. This incision permitted the permanganate solution to escape. By holding the catgut sutures tense the bladder wall was drawn tightly up against the abdominal wall. Immediately after opening the bladder a double drainage tube (Fig 84, 2) was inserted into this opening and the remainder of the fluid was siphoned out of the bladder by means of this drainage-tube. The end (a) was carried into the bladder up to the point b (Fig 84, 2) where the outer drainage tube covered the inner one. The tube was then fastened in place by means of two little catgut sutures which were passed through to the outer rubber tube but not through the inner tube in order not to obstruct the latter and in order to prevent the accumulation of phosphates within the inner drainage tube. The remaining space of the wound was then packed with iodoform gauze.

Fig 84—1 Perineal prostatectomy. Grooved sound in urethra. line of incision shown at a. 2 Incision through the urethra exposing the sound. 3 Median section showing position of sound and knife just before entrance of both into the bladder.



Tom Jones

Fig 84

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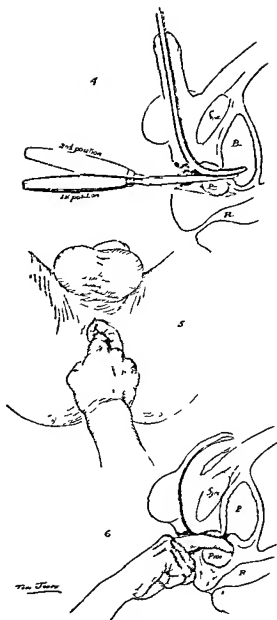


Fig 85

saturated with vaselin in order to permit any leakage which might occur around the drainage-tube to pass out without infiltrating the connective tissue of the abdominal wall. The tube was further held in position by the application of a suture through the edges of the wound in the manner indicated in Fig 86 10 by applying suprapubic drainage in this manner the urine can be siphoned out practically without soiling and without discomfort to the patient. This form of drainage we usually continue for one to three weeks. In the present case we continued it for twelve days when the perineal prostatectomy was made.

In the meantime the patient received $\frac{1}{2}$ pint of distilled water to which from 2 to 3 drops of dilute hydrochloric acid or from 2 to 3 grains of boric acid were added every hour during the daytime and two or three times during the night. This will usually prevent the deposit of phosphates in the drainage tube.

It is now twelve days since I did the cystotomy which I have just described. The patient's condition is quite favorable and I am now ready to carry out the second step in the operative cure of this disease.

The same method of anesthetization is employed as in the primary operation. The object being to give the patient as small an amount of anesthetic as possible because of his age. The bladder is irrigated with 1:4000 solution of potassium permanganate and the perineum is shaved and disinfected. Then a grooved sound is introduced into the urethra and through the neck of the bladder.

We now make an incision reaching half way between the anus and the tubercle of the ischium to a point half way between the scrotum and the anus (Fig 84 1). This leads us to the urethra which is opened over the groove in the end (Fig 84 2). A blunt pointed knife ground in the manner shown in Fig 85 4

Fig 85—4 The lithotomy knife has been carried into the bladder. Second position shows the procedure of cutting through the posterior urethra and prostate. The rectum liable to injury during this step. 5 and 6. The index finger is carried into the bladder and a line of cleavage is found between the bladder and the prostate.

so that the blunt end will run in the groove of the sound is introduced (Fig 84 3) The sharpened notch will split the urethra from the point of the primary incision into the bladder

The urethra is slit into the bladder while it is held close to the pubic bone in order that the knife may not cut through into the rectum. It is important to guide the knife with care in order that no damage may be done while it is being passed into the bladder This step is precisely the step that was formerly taken in performing perineal lithotomy The damage done by this incision, if properly carried out, amounts to nothing as has been demonstrated by many thousands of lithotomies while perineal lithotomy was in vogue Should the knife be carried in the direction of the second position (Fig 85 4) it would of course be possible to enter the rectum but by hugging the symphysis pubis closely with the sound this can easily be avoided. The finger is carried into the bladder (Fig 85 5) the grooved sound having previously been withdrawn and the knife being used as a guide which can safely be done by turning the cutting edge away from the finger The finger is carried entirely into the bladder and then it is carried downward laterally (Fig 85 6) entering the capsule through the urethra precisely as it would were one to make a suprapubic prostatectomy It is quite as easy to discover a line of cleavage with the finger in this position as it is with the finger in the suprapubic opening After the capsule has been loosened from the gland over the greater portion of its surface one usually encounters a few bands of adhesions which should be lifted up with the finger and caught with a pair of Kocher forceps and cut with the scissors because these bands usually extend to the urethra, and if roughly handled may cause injury to the urethra After one lobe has been loosened it is permitted to fall back into the capsule and the finger is carried to the other side loosening the second lobe in the same manner Then a pair of Young's forceps are carried into the wound alongside of the finger and the edge of the loosened gland is caught by these and is drawn out through the wound (Fig 86 7) The bands which still hold this lobe are caught with forceps and separated with the scissors. The second lobe is

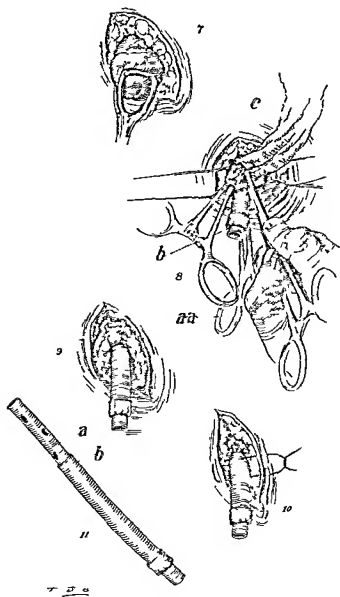
treated in the same manner and then the finger is introduced into the bladder again to search for the middle lobe or for super numerary lobes which sometimes exist. These are treated in the same manner. Then the finger is again introduced into the bladder and the neck of the bladder is caught by means of two mouse tooth forceps of the Allis pattern in order to hold the neck of the bladder and the edge of the capsule in position while the subsequent steps are carried out.

A double drainage-tube (Fig 86, 11) with perforations is carried into the bladder, using the finger as a guide. The tube is introduced to the point *b* (Fig 86, 11). The object of passing this portion of the tube double lies in the fact that it will be possible to tampon against this double tube without causing its collapse. While the neck of the bladder and the capsule of the prostate are held in position by forceps *a a* (Fig 86, 8) a loop of gauze (Fig 86, 8, *c*) is snugly tucked into the capsule of the prostate gland against the double tube the wound itself being held open by long flat retractors which reach to the edge of the capsule. After the packing has been accomplished the retractors are removed and the rubber drainage-tube is fastened in place (Fig 86, 10). It is practically always possible to control hemorrhage completely by this tampon. The suprapubic drainage-tube is left in place in case clots of blood accumulate in the bladder which occurs very seldom. The bladder is irrigated through the suprapubic tube and the clots permitted to wash out through the perineal tube.

The perineal tube and the gauze will be removed on the second day after operation when they will have accomplished their object of controlling the hemorrhage. The suprapubic tube will be left in place for one week after completion of the operation.

The patient will be permitted out of bed at the end of from three days to one week. Urine begins to pass normally from ten to twenty days after the operation.

The use of the distilled water will be continued until the suprapubic drain is removed. The patient will be permitted to take hot tub baths daily after one week following operation.



Fg 86

Note—This patient was discharged from the hospital ten days after the second operation

The advantage of the technic here demonstrated lies in the fact that it can be performed in the same time that it is possible to make a suprapubic prostatectomy and through a much smaller incision and with less traumatism to the patient. The small suprapubic incision that is necessary to drain the bladder preliminary to the perineal prostatectomy does not give the great discomfort to the patient that is usually experienced after the suprapubic prostatectomy. Neither does it involve so extensive an adhesion of the anterior surface of the bladder to the abdominal wall. The method also provides for very satisfactory natural drainage through the perineum which is far more cleanly than is usually observed in suprapubic prostatectomy. In cases in which the patient is younger and in which the obstruction is of only mild degree, where there is no cystitis and certainly no involvement of the kidneys, a perineal prostatectomy can be done safely without the preliminary cystotomy, but in any case in which there is doubt it is always best to make a preliminary suprapubic cystotomy.

For some time we practised suprapubic drainage by inserting a trocar into the distended bladder and then slipping a catheter through the trocar into the bladder and withdrawing the trocar leaving the catheter in the bladder and fastening it in this position for the purpose of drainage but in several cases we experienced infiltration of the connective tissue in front of the bladder so that we have abandoned this method entirely and have substituted the method described in this patient.

In many cases we have employed spinal anesthesia with entirely satisfactory results. In these cases we have given the

Fig 86—7 The prostate gland (one lobe) isolated except at urethra from which it is severed by means of scissors and removed in the grasp of a pair of Young's forceps. 8 Two forceps (*a a*) are clamped on the edges of bladder the drainage tube (*b*) is inserted and a strip of gauze (*c*) is packed around the tube and into the prostatic space. 9 Drainage tube and packing in position. 10 Method of suturing tube in place with silkworm gut. 11 Detailed drawing of drainage tube made up of an inner tube (*a*) and an outer (*b*) the inner tube having several small perforations.

patient $\frac{1}{4}$ grain of morphin and $\frac{1}{16}$ grain of atropin one-half hour before injecting the solution of apothesine into the spine and have waited for twenty minutes after the injection of this fluid before undertaking the perineal prostatectomy. Then we have carried out the operation of prostatectomy precisely as described above, the patient usually conversing with one of the assistants throughout the period of the operation. The spinal anesthesia is employed according to the well known plan which I believe is generally practised by the many surgeons who make use of this method in preference to a general anesthetic. This method was described by Dr D A Orth in the Surgical Clinics of Chicago, February, 1919.

In all these patients of advanced age we elevate the head of the bed from 12 to 18 inches in order to prevent hypostatic congestion of the lungs. We also prefer to keep these patients *in bed for a number of days before the primary operation* because they seem to become accustomed to being in bed and seem to show less tendency to postoperative pulmonary congestion.

CLINIC OF DR HERMAN L KRETSCHMER

ST JOSEPH'S HOSPITAL

CARCINOMA OF THE BLADDER

Summary Diagnosis of carcinoma of the bladder usually made at a time when effective treatment is no longer possible because of failure to appreciate import of early symptoms. Necessity of cystoscopic examination in all cases of hematuria. Operation—resection of tumor—technic of closure of bladder wall. Comments on diagnosis and treatment of bladder tumors.

THE patient we have for operation this morning is Sister M C, aged forty-eight, who gives the following history.

Her family history is negative. At the age of seventeen the patient was sick in bed for six months, at that time the diagnosis was uric acid poisoning. Menstruation has always been regular, and ceased in May 1918 just preceding the onset of the present trouble.

Hematuria was the first symptom the patient noticed, and this began in May, 1918. The hematuria was not present constantly and there were often intervals of a week between the attacks of bleeding. Sometimes the blood was passed at the end of urination and at other times the urine and blood were well mixed. Large clots of blood have been passed from time to time. The hematuria continued without pain from May until October.

Painful urination began in October, 1918, and was described as burning in character. The pain was present during urination. The patient states the pain was also present in the bladder at all times becoming more severe after urination. There was also present a sharp lancinating pain which radiated up along the spine when the patient was lying down.

Pyuria began in October. **Frequency** also began in October, at which time she was obliged to void fifteen to twenty times during the day and twenty to twenty five times during the night. The patient states that very little urine is passed at a time. During the past four weeks this symptom has not been quite so pronounced.

During the past summer the patient noticed that there were small pieces of tissue passed with the urine, and occasionally these were passed with clots of blood.

Polydipsia began in October. It came on suddenly and has been very severe.

Physical Examination—Head, neck, heart, and lungs are negative.

Abdomen—There is a good deal of tenderness upon pressure in the epigastrium. The liver is not enlarged. The kidney and spleen are negative. The patient complains of some tenderness upon pressure over the bladder.

Reflexes, glandular system, and extremities are all negative.

Urinalysis shows the presence of albumin and blood pus-cells and epithelial cells. A culture shows the presence of colon bacilli and staphylococci.

Blood examination shows 3,490,000 red cells, 8150 white cells, and 75 per cent. hemoglobin.

Blood pressure is 150 systolic and 90 diastolic.

Roentgen ray examination is negative for stone in the urinary tract. Roentgen ray examination of chest for possible metastasis in lungs is negative.

Cystoscopic Examination—This was painful and difficult owing to the limited bladder capacity. Only 2½ ounces of water could be introduced into the bladder. This examination showed the presence of a large tumor at the junction of the posterior and superior walls of the bladder. The tumor was surrounded by edema. The surface of the tumor was irregular and on it were large necrotic shreds.

There are two things of interest in this patient: first the relatively long duration of the symptoms, second the location of the tumor. The hematuria began painlessly, and the patient

states very definitely that there were no symptoms other than painless bleeding for six months. After October the symptoms became violent very rapidly and the patient suffered intense pain. During October the patient passed fragments of the tumor and yet with this history the patient has gone on for one year before being cystoscoped. The patient represents the average patient who comes to the genito urinary surgeon seeking relief for carcinoma of the bladder. Unfortunately no attention is paid to the hematuria and many of these patients are treated symptomatically so that when they do come for relief surgical treatment is out of the question. It is unfortunate that these patients are not seen earlier because I believe that the results of surgical treatment of tumors of the bladder could be very materially improved as regards the end results if these patients were started on the road to treatment as soon as the first symptoms were noticed. Instead the patient comes to us late in the course of the disease owing to the fact that there has been too much procrastination.

The second point of interest is that this tumor is located in a part of the bladder which allows wide resection of the tumor. Most of the tumors of the bladder occur in the region of the trigone involving one or both ureteral orifices or around the neck of the bladder parts of the bladder which anatomically and physiologically do not lend themselves to resection as readily as do the superior or posterior walls.

Microscopic examination of some of the tumor fragments that were obtained in the wash water at the time of cystoscopy showed the presence of a very rapidly growing carcinoma.

After considering the facts it was decided to operate on this patient and it is my plan to carry out a wide resection of the tumor.

The bladder having been filled with water and the patient put in the Trendelenburg position I will make the usual supra pubic incision extending from the symphysis pubis to the umbilicus. The incision is carried through the fascia of the rectus muscle and the fibers of the rectus are separated with the blunt end of the scalpel. The peritoneum is dissected back with a

piece of gauze. Owing to the fact that we wish to perform a very wide resection I will carry the peritoneal dissection well

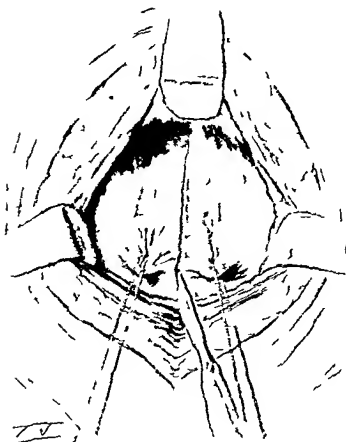


Fig 8 —The peritoneum has been stripped back as far as the base of the bladder. A long incision is made between the two silk worm-gut sutures

down toward the base of the bladder. In order to lift up the bladder and facilitate stripping the peritoneum from it I will

place two large sutures of braided silk in the bladder, one on each side of the median line (Fig 87) These can be used as traction sutures In dissecting the peritoneum from the bladder a large, peculiarly hard area is felt at the junction of the superior and posterior walls of the bladder This hard area is the tumor which we saw with the cystoscope In view of the fact that the tumor is much larger than I thought it was from the cystoscopic picture I will open the peritoneal cavity to determine whether or not any metastases can be seen or felt Not being able to feel or to see any signs of metastases in the peritoneal cavity, I will close the peritoneum with fine catgut and the dissection of the peritoneum will be continued down to the base of the bladder

A long median incision is now made into the bladder cavity after having first packed the abdominal wound with large gauze sponges in order to pick up the water that escapes through the incision When the bladder is opened a large tumor as you see, immediately comes into view No doubt the size of the tumor was underestimated owing to the fact that proper distention of the bladder could not be obtained Attention was called to this limited bladder capacity in reading the history

Now that the bladder has been dissected free and the cavity opened the next step is to apply two long clamps, one at each side of the tumor Owing to the fact that we have plenty of room the clamps can be so placed that the incision passes at least 1 inch away from the margins of the tumor The clamps are applied obliquely so that their distal ends meet (Fig 88) With the scalpel the entire tumor and the bladder wall between the clamps is excised in one large mass There is no bleeding as you will see owing to the fact that the clamps take in the entire thickness of the wall of the bladder

Closure of this incision is effected by bringing the two clamps together and introducing a continuous suture of catgut care being taken to see that the suture passes through all the layers of the wall of the bladder except the mucous membrane (Fig 89) As you see this is done rapidly and is not a very difficult procedure in this instance owing to the fact that the bladder is quite mobile and the patient is a thin woman with thin abdom

piece of gauze. Owing to the fact that we wish to perform a very wide resection I will carry the peritoneal dissection well

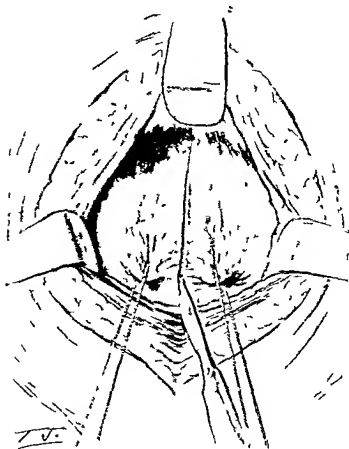


FIG. 8 —The peritoneum has been tripped back as far as the base of the bladder. A long incision is made between the two silkworm-gut sutures.

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drain into the bladder cavity. A large strip of iodoform gauze will be packed between the bladder and the peritoneum behind

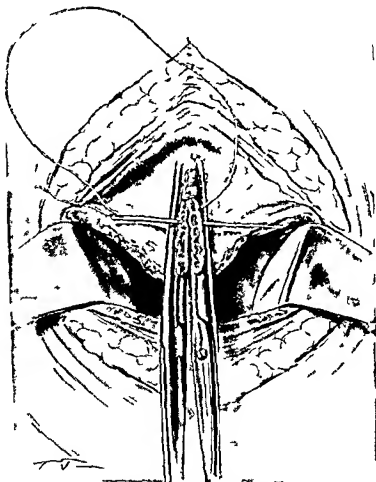


Fig. 89.—The clamps have been approximated and the first layer of catgut sutures is being passed through the bladder wall. The mucous membrane is not included in this suture.

and a small strip will be placed between the bladder and rectus muscle in front.

mal walls. The sutures are tied at the upper end and the clamps removed. A second row of catgut sutures will be placed

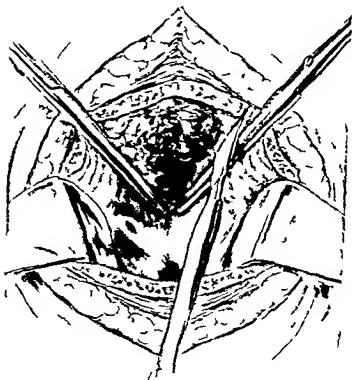


Fig 88.—The clamps, one on each side of the tumor, have been placed so that the incision by which the tumor excised pass at a safe distance from the neoplasm.

over the first to reinforce it. We will now close our first incision in the bladder in the same manner and insert a small rubber

true in hospital practice I believe the results in the treatment of carcinoma of the bladder could be very much improved if by education the patients could be made to seek treatment early I think it is a perfectly fair statement to make that the largest percentage of tumors of the bladder that one sees in hospital practice come to one at a time when the outlook is absolutely hopeless and this statement holds true with a good many of our private patients as well

The diagnosis of tumors of the bladder can certainly be made very easily and quite definitely I think that perhaps the reason that these tumors are overlooked is because the possibility of bladder tumors in so many of these cases is not thought of So many times the patients are told that they have chronic cystitis an irritable bladder or nephritis and are treated accordingly The simple fact that the patient has bladder distress or hematuria or both and the fact that the patient is of cancer age should be enough evidence to warrant a thorough and complete examination so that carcinoma may be excluded if it is not present Many of the patients who have symptoms extending over a long period of time are treated first with medicine and then with local applications to the bladder all without relief and then when they come with this history one can almost make the diagnosis from the history alone

The history should be carefully elicited and due consideration should be given to the history after it is obtained The history in these cases is of prime importance especially if you are the family physician who as a rule is the first one to see the patient

The physical signs early in the course of the disease are of course practically negative It is perhaps because of this fact that so many cases are not recognized The patients have no tenderness in or around the bladder There is no change in the rectal findings in men or in the vaginal findings in women When the physical signs are marked in the majority of instances it is too late to promise the patient very much in the way of a complete cure By the time that vaginal examination reveals an enormously thickened base of the bladder or a thickening in

Note—The histologic examination of this tumor was made by Dr W H Burmeister Pathologist to St Joseph's Hospital, who reported a *carcinoma of the bladder*. His description states that it is a nodular polymorphous-celled carcinoma growing in



Fig 90—Specimen after removal note areas of necrosis on the surface of the tumor

solid cell masses of alveolar structure with very definite stroma septa (Fig 90)

COMMENTS

The treatment of malignant bladder tumors offers no exception to the sound surgical principles that underlie the treatment of malignant tumors in any other organ of the body. The results obtained in the treatment of vesical neoplasms are in direct ratio to the time at which the patients are brought in for treatment. In other words, the same rule applies here that applies to the treatment of carcinoma of the breast, uterus, stomach and carcinoma elsewhere. In the majority of patients which one sees every year one is called only to make the diagnosis because the question of treatment is out of consideration owing to the fact that the patients are beyond surgical relief. Not only is this true in private practice but it is especially

swollen and fluffy Not infrequently one sees changes in the blood vessels around the base of the tumor In malignant tumors they are large tortuous and dilated Occasionally one finds areas of necrosis in the tumor so that you see one has several very good guides in putting one on the lookout for the possibility of a malignant tumor

In rare instances it may be impossible to differentiate and to make a definite diagnosis In such instances two courses may be open One of these would be to resort to microscopic examination of pieces of the tumor removed by one of the various types of operative cystoscopes This procedure is questioned by some because of the possible danger of causing the tumor to spring into activity This method has also been criticized because one might remove a piece of the tumor that is normal and hence lead to an incorrect diagnosis My practice has been to resort to removal of pieces of tissue for histologic study in cases in which any doubt ever arises in my mind regarding the nature of the tumor In the majority of instances this is not necessary because one can differentiate with the cystoscope

Now then whenever a case occurs in which I desire for one reason or another to obtain a histologic section I have no hesitation whatever in removing a small piece for histologic study Instead of resorting to the removal of a piece of tumor for study one may examine the fragments of the tumor that are found in the wash water during cystoscopic examination I never fail to take advantage of this fact as we did in this case today The patient told us that she had been passing pieces of tumor for the past six months and so when we irrigated the bladder previous to the cystoscopic examination we were on the lookout for fragments of tumor and we were rewarded by obtaining a half dozen pieces of tumor as large as peas which were subjected to histologic examination and which showed a very rapidly growing carcinoma In certain instances fragments may not be obtained in this way and then we may resort to the use of the high frequency spark

In benign papillomata one or two applications of the high

the posterior wall of the bladder, or when the vaginal wall shows a good deal of infiltration a radical operation is impossible. In the later stages, when a large mass can be felt in the suprapubic region it is needless to say that this diagnosis as far as the patient is concerned is without value. In patients of the cancer age with bladder symptoms one should never consider the examination complete unless the patient has been examined by the cystoscope. By means of cystoscopy one can easily demonstrate or exclude the presence of a neoplasm. Because so many of these patients have hematuria, it would be a good rule to have each patient with hematuria, especially patients of the cancer age, examined with a cystoscope. The cystoscopic examination enables one to demonstrate at once the size and location of the tumor or tumors in cases in which they are multiple. One can demonstrate and quickly determine the exact relationship to the ureteral orifice and neck of the bladder, which is important in considering surgical interference. As a general proposition one can make a fairly accurate diagnosis as regards the nature of the tumor from the cystoscopic examination alone.

The most frequent tumor as you know is the so-called benign papilloma. This has been described to you many times and presents a picture familiar to all. The tumor as a rule, has a pedicle and is more or less freely movable. The frimbriated portions of the tumor wave in the media with which the bladder is distended and the small blood vessels can be seen in the ramifications of the tumor. When one sees this picture it is fair to assume that one is dealing with a so-called papilloma of the bladder.

In frank cases of cancer of the bladder and tumors of the epithelioma type one can likewise make a definite diagnosis. However, a great deal of difficulty may be experienced in the diagnosis of benign tumors which have undergone malignant change. Some of the cystoscopic data may help us out in the differentiation. A tumor, for example may appear at first sight to be a benign papilloma. Upon closer examination however, the bladder mucosa may show a definite amount of edema around the tumor, so that the mucous membrane is

CLINIC OF DR EDWARD LOUIS MOORHEAD

MERCY HOSPITAL

RUPTURE OF QUADRICEPS EXTENSOR TENDON. OPERATION, RESULT

Summary A case of rupture of the quadriceps tendon presented for treatment four months after the original injury. Diagnosis Treatment—tendon lengthening. Result six months after operation.

THE first patient this morning is shown that you may see the end result of an operation which was performed six months ago.

She is an unmarried American woman twenty five years of age. She presented herself to us six months ago with the following history. Four months previously, in alighting from a buggy on a rough country road her right foot slipped and she fell beneath the buggy. She was unable to rise or to stand alone when assisted to her feet by her companions. They had her removed to her home and a physician was called to attend her. Their statement is that the diagnosis of the injury made by the physician at that time was not quite clear. However, the patient was put to bed and a plaster of Paris cast applied to the entire limb. This cast was allowed to remain for six weeks, when it was removed and liniments and other applications were used on the limb. She states that during all this time she was assured that the limb would be all right, but there was no improvement at all and she was unable to use the limb.

Four months from the date of receiving the injury the patient was brought to the hospital for treatment. At that time the following points are noted in her history.

'Patient well developed, weight 160 pounds, no history of any previous injury or illness. Examination of head, chest and abdomen negative. Examination of extremities negative except for the right limb. The patient is able to flex the right leg upon

frequency spark will have a favorable therapeutic effect namely it will cause a rapid diminution in the size of the tumor. Many men have claimed that if a tumor is subjected to the high frequency spark and if there is not an appreciable change in the tumor after one or two applications such a tumor can be or should be considered a malignant tumor, as it is uniformly recognized and admitted that the high frequency spark is of little value in frank carcinoma.

Ordinarily I do not believe that the difficulty in making a diagnosis is very great if the patient comes to the genito-urinary surgeon early. I think the difficulty in this class of cases arises from the fact that these patients are not brought to us early in the course of their disease. It has also been recognized that many tumors of the bladder that have been diagnosed carcinoma as the result of histologic examination have been caused to disappear by the use of the high frequency current. On the other hand there are cases in which a diagnosis of benign tumor has been made and in which the high frequency current has failed to give relief.

The question of the use of radium in this instance may be discussed. I believe that in view of the fact that the patient's general health is so good and the tumor is located in a part of the bladder which lends itself most admirably to resection one is justified in adopting the line of treatment which has been demonstrated today in preference to the less radical procedure involved in the use of radium.

the thigh but is unable to extend it. Lying upon her back she is unable to lift the right limb or to flex the thigh upon the abdomen. She is unable to stand erect upon her feet even with assistance and cannot place any weight upon the right foot. There is a slight atrophy of the muscles of the right thigh and leg, presumably the result of non use.

'By manipulation no fracture of the patella or the bones of the leg or thigh can be determined. Careful examination of the anterior surface of the thigh reveals the patella in proper position but there is an apparent separation of its upper edge from the quadriceps extensor tendon. This separation is about $2\frac{1}{2}$ inches there being quite a depression between the patella and the upper detached end of the tendon. The x ray plates made at this time did not show any fracture or injury to the bones."

The condition therefore with which we had to deal was a rupture of the quadriceps extensor tendon produced by violent muscular contraction when the patient slipped and fell beneath the buggy.

What was to be done for a condition such as this? Remember that the injury was four months old and the muscles had retracted about $2\frac{1}{2}$ inches. It was hardly probable that we would be able to bring down the torn end of the tendon and suture it to the patella as the traction on the sutures would be too great. We therefore decided upon the following procedure, which was carried out.

After proper preparation the patient was anesthetized with ether. A semicircular incision with the convexity downward and extending over the upper edge of the patella was made with a vertical arm extending upward on either side of the tendon a distance of about 3 inches (Fig 91 1). The flap of skin and superficial fascia was reflected upward exposing the ruptured tendon. The tendon was freed from the surrounding adhesions and an attempt was made to bring it down in apposition to the patella. This could not be accomplished on account of the marked retraction of the muscle. It was then decided to lengthen

Fig 91 —1 U shaped incision for exposure of ruptured tendon. 2 and 3 Tendon lengthening as practiced in the case demonstrated.

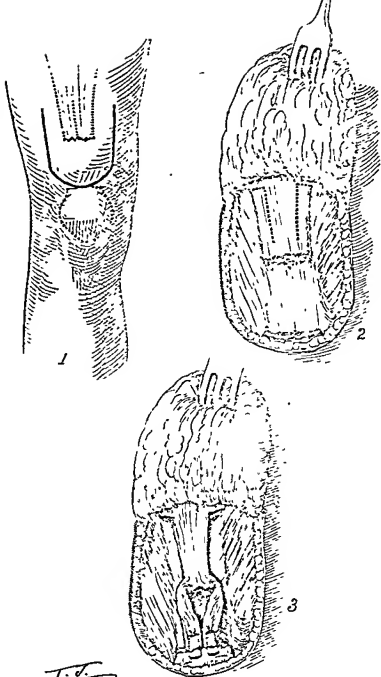


Fig 91.

VARICOCELE

Summary Etiology symptomatology and diagnosis of varicocele Treatment—palliative in early and mild cases Indications for operation Technique of excision of the varicose veins Causes of failure to cure by operation

THIS young man is twenty two years of age He gives the following history

For the past year he has had a sense of weakness and dragging down in the back and the scrotum while standing or working unless he wears a supporter There is also he states pain in the penis and along the groin Sexual neurasthenia and increased sexual excitement are present The left side of the scrotum has gradually increased in size He has lost about 15 pounds in weight during the past year

His past history is negative in so far as the present complaint is concerned no venereal history

Physical Examination—The patient is a well developed and well nourished adult male The head chest and abdomen are negative no adenopathy no scars about the genitalia

The left side of the scrotum is enlarged to about the size of a man's fist This enlargement is due to a mass of dilated veins of the pampiniform plexus producing what is commonly termed a varicocele

This condition is frequently met with in young men but seldom in those of advanced age except when it has become chronic or is due to malignant disease of the kidney It usually occurs in individuals with a lax and pendulous scrotum and is often associated with masturbation which induces abnormal vascularity of the testis The fact that it sometimes occurs in quite young boys suggests however that there is some congenital condition associated with it It may also be caused by the pressure of a truss applied for relief of a hernia As a rule the varicocele occurs in the left side and the usual causes assigned

the tendon. An incision about $\frac{1}{2}$ inch deep was made on either side of the tendon about 3 inches above the torn end and the strip formed on either side separated downward to within 1 inch of the torn end of the tendon (Fig 91 2). These two strips now forming a prolongation of the tendon were sutured without any tension to the patellar end of the torn tendon by mattress sutures of kangaroo tendon (Fig 91 3). The fascia was closed with catgut sutures and the external wound with interrupted silk worm gut sutures without drainage. A plaster-of-Paris cast encasing the entire limb in a straight position was applied.

The postoperative history was uneventful. There was very little discomfort and the wound healed primarily. At the expiration of four weeks the cast was split and passive motion was begun. The limb was replaced in the cast after each exercise and the cast held in place by a roller bandage. The patient made very good progress and eight weeks following the operation she was permitted to be transported to her home 600 miles distant. At that time she could flex the thigh upon the abdomen and extend the leg fairly well. She wore the retentive dressing on her limb during the journey home and was instructed as to the proper management of the limb in after-care.

Today six months from the date of the operation the patient returns that we may see the result. She is able to flex the thigh upon the abdomen to extend the leg and walks without any apparent difficulty. The result is all that could be desired.

The lesson to be learned from this case is—be more careful in the examination of injuries about joints. Where you are unable to demonstrate either by manual examination or x ray plates any injury or fracture of the bones do not forget that there may be serious injury to the tendons. Because the joint is swollen and you have been unable to find a fracture do not be satisfied and call it a sprain. Repeated and careful examinations may reveal to you the true nature of the injury and save you much trouble later.

sexual hygiene and supplied with a proper suspensory early it would be all that would be necessary

Two methods of surgical treatment of varicocele have been used. The first one, subcutaneous ligation, is mentioned merely that you may know of it. At the present time it has been practically discarded and I regard it as obsolete. The other method is the open operation and excision of a portion of the veins. This operation, if properly done, gives excellent results.

Operation—Ether anesthesia. The patient has been prepared in the usual manner. An incision about $1\frac{1}{2}$ to 2 inches in length is made in the upper anterior part of the scrotum through the loose tissues down to the cord. The cord is dissected free by gentle blunt dissection, hooked up with the finger and drawn out of the incision. The connective tissue forming the sheath of the cord is carefully incised longitudinally, exposing the veins and the other structures that form the cord. The vas deferens, with the loose tissue about it, is isolated so as to preserve the vessels passing with the vas and held apart. Two main branches of the veins are found in this situation. These are carefully isolated and a catgut ligature is applied to them high up near the external abdominal ring. The veins are now clamped with a pair of artery forceps below the ligature and divided between the ligature and the forceps (Fig 92 1). In dividing the veins keep about $\frac{1}{4}$ inch from the ligature. This is done in order to allow sufficient tissue to pass a suture through the stump distal to the ligature in order to bring the stumps together.

The lower end of the divided veins grasped by the forceps is stripped downward so as to free the pampiniform plexus from the other elements of the cord and the dissection will be carried nearly as far as the epididymis by drawing the testicle up into the wound. The lower end of the veins is now ligated in two parts and divided in the same manner as the upper portion (Fig 92 2). By this method practically the entire varicocele is removed. A fine catgut suture is now passed through the two lower stumps distal to the ligatures and then through the upper stump in a like manner. When this suture is tied approximat

for its production there are: first, the left testis usually hangs lower than the right, and consequently the spermatic veins are longer and exposed to greater blood-pressure; second, the left spermatic vein opens into the left renal vein at a right angle, and no valve is present at the orifice; while the right spermatic vein opens obliquely into the vena cava and is valved, third, the presence of the sigmoid flexure on the left side of the body and its distention by accumulated feces as a result of constipation may produce pressure on the left spermatic vein.

A varicocele is characterized by the presence of a soft irregular swelling in the scrotum, somewhat pyramidal in shape, the base below overlapping the testis, and the apex above. It is made up of the dilated and tortuous veins, the outlines of which may frequently be seen through the skin of the scrotum. They impart a sensation to the finger which has been likened to a collection of worms in a bag. Upon pressure the veins are readily emptied, but instantly fill again when the pressure is removed. In mild cases the veins subside to normal dimensions when the patient lies down, but reappear at once when he stands erect. When the varicosities extend into the inguinal canal there is an impulse on coughing. A sensation of weight and pain frequently accompanies a varicocele and sometimes there may be severe neuralgia of the testis. Atrophy of the testis may result from varicocele and seminal emissions are sometimes laid to the same cause.

Treatment.—Slight cases of varicocele are treated by applying a well-fitting suspensory bandage and also instructing the patient to bathe the parts with cold water night and morning, and to use such measures as are necessary to ensure a daily bowel movement.

Surgical treatment of varicocele is indicated in neuralgic cases, in large varicocele where atrophy of the testis is threatening, as in the present case, and in many cases to fit the patient for admission to the public service.

Many of these patients imagine their condition is worse than it is, and they become the prey of various advertising quacks. If they were given the proper advice as to their mode of living,

sexual hygiene and supplied with a proper suspensory early it would be all that would be necessary

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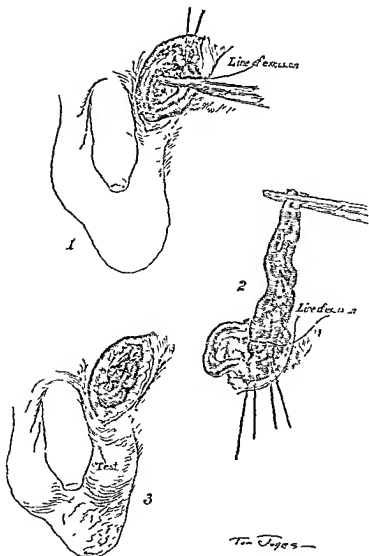


Fig 92—1. Veins isolated at external inguinal ring, ligated and clamped, to be severed just above the clamp 2 Segment of varicocele to be removed, beginning at the upper end, has been dissected free nearly to the testicle and there ligated. The next step will be to cut the veins as indicated at the line of division. 3 Stump of varicocele united, thus shortening the cord and elevating the testicle

ing the upper and lower stumps the cord is thereby shortened and the testicle raised (Fig 92 3)

The connective tissue sheath will also be shortened by suturing it with fine catgut. The wound in the scrotum is now closed with a few interrupted silkworm gut sutures. Before tying the silkworm gut sutures always be sure that there is no bleeding thereby avoiding troublesome hematoma which will surely form if there is any hemorrhage. The usual dressings are now applied in such a manner as to support the scrotum.

The patient will be kept in bed for about ten days to two weeks to allow organization and a firm cicatrix to form between the divided ends of the veins. This method of exposing the veins high up is much better than that in which the incision is made lower down in the scrotum. It is much easier to dissect the veins out from above where only one or two trunks exist.

This operation results almost uniformly in cure. The failures are due to the ligatures not including all the varicose veins. The slipping of the ligatures down over the stumps resulting in secondary hemorrhage and great difficulty in securing the veins which may have retracted up into the inguinal canal or down into the scrotum. Accidents of this kind may result in very extensive loss of blood and require secondary operation under general anesthesia in order to find and secure the bleeding vessels. Injury to the vas may occur. Ligature of both arteries to the testis may result in necrosis.

SEPTIC GALL-BLADDER WITH SPONTANEOUS CHOLE- CYSTENTEROSTOMY

Summary A patient ill four weeks presenting symptoms of septic gall bladder, peritonitis and intestinal obstruction. Operation—gall bladder found adherent to transverse colon with large calculus occluding a communication between gall bladder and colon at site of adhesions.

THE history obtained in this case is given by the son of the patient, the patient being in no condition to give a satisfactory history. He states that his mother is sixty two years of age, and that her illness began four weeks ago. At first there were severe pains in the abdomen, more on the right side. The pains were intermittent, lasting about ten minutes at a time, and recurring about every hour. There was nausea and vomiting. For the past four days the pain has been continuous and increased in severity. The vomiting has persisted and for the past forty-eight hours she has been unable to retain anything in her stomach. The vomitus has a very foul odor, fecal in character. There has been no bowel movement for the past four days, and previous to that time he says they were unable to cause the bowels to move except very slightly.

The son states further that his mother has had stomach trouble for many years at times having attacks of cramps and vomiting spells. The bowels were always constipated. She is the mother of 6 children all living and well. There is nothing further that we can obtain in the history of this patient except that she has been attended by a physician during this four weeks' illness and that two days ago a second physician, who had treated the patient some years previously, was called in attendance. He immediately advised surgical measures as the only hope for relief and the patient was transported 400 miles to Chicago arriving here about two hours ago.

Upon examination the patient is found to be in a very serious condition. The pulse is 120, weak and small. Temperature 97°

F, respirations 34 There is persistent vomiting of a fecal character The abdomen is distended The blood count shows leukocytes per cubic millimeter, 17,720, erythrocytes per cubic millimeter, 4,750,900, hemoglobin 65 per cent.

Urinalysis—Specific gravity, 1022, reaction, acid, albumin good trace, few hyaline casts, many white blood-cells.

Since the patient's arrival in the hospital she has received stimulation and has been prepared, as best she could be under existing conditions, for operation.

Certainly this is not a very promising case—a true surgical emergency in a very poor surgical risk. The family appreciate the condition having been so advised by the last physician and they desire that we do the best that we can.

The tentative diagnosis is Ruptured septic gall bladder, peritonitis, and intestinal obstruction.

Operation.—Ether anesthesia. Believing that we have a ruptured gall bladder to deal with, a vertical incision about 3 inches in length is made through the outer third of the right rectus, beginning about 1 inch below the margin of the ribs. Upon opening the peritoneum the various structures are found to be matted together by very extensive adhesions. The omentum is adherent to the anterior surface of the liver. The gall bladder cannot be seen. There is evidence of quite diffuse peritonitis. An attempt will be made to separate the omentum from the anterior surface of the liver and thereby expose the gall bladder. A couple of laparotomy pads are used as packing to wall off the surrounding area for fear there may be an escape of some infective material.

With the finger covered by gauze a gentle separation is started in the line of cleavage between the anterior surface of the liver and the omentum. As this is separated the fundus of the gall bladder is exposed and a large stone is felt beneath the finger. The wall of the gall bladder at this point is very thin the stone having practically passed through the gall bladder wall and being held in this position by the adherent omentum. The surrounding area having been well protected by pads the stone is removed and there escapes a quantity of foul smelling pus.

There are two more stones of similar size (about the size of a hickory nut) and they are removed. Following their removal there escapes a large quantity of purulent material having a distinct fecal odor. This cavity is quite large, and it would be impossible under the circumstances to isolate the gall bladder and remove it. It would be unwise to break up these adhesions at this time, and there is no doubt in my mind but the cavity of the gall bladder communicates with the transverse colon. No doubt as a result of pressure necrosis produced by the stones in the gall bladder a communication has been established with the transverse colon. Under these conditions the proper procedure will be to establish free drainage and close the wound.

Two fair sized rubber tubes are introduced down to the bottom of the cavity. A couple of strips of gauze are placed alongside of the tubes. The external wound closed in the usual manner and a large dressing applied.

The patient's condition now is as good as when the operation was started but it is not such as to make any extensive operative procedure permissible. Any further surgery that the case may demand can be done at a more opportune time. The patient will be returned to her bed. External heat applied and such stimulants as are necessary will be given. Her condition is fair, she has withstood the operation very nicely, and our efforts will now be to overcome operative shock if any develops.

As to the prognosis this must be guarded. You must consider the patient's age, the length of time she has been sick, the degree of sepsis and her general condition previous to operation.

CLINIC OF DR. CARL B. DAVIS

PRESBYTERIAN HOSPITAL

CERVICAL RIB

Summary Demonstration of cases illustrating the cervical rib syndrome. Discussion of symptomatology, surgical pathology, diagnosis and treatment.

THE first patient whom I present was operated on three years ago. Her clinical history reads as follows:

Miss A. H., age twenty-five. Telephone operator. The patient is conscious of distress in the neck and left shoulder. As long as she can remember the use of her left arm has increased the discomfort. During childhood she was frequently punished for standing with her shoulder drooping. Pain has never radiated into the arm. Recently the pain has been so severe that she performed her switchboard work with considerable difficulty.

Examination shows a slender young woman with normal physical findings except that in the left side of the neck a fixed, hard, longitudinal mass is found on deep palpation. The patient stands with a droop of the left shoulder. She is able to straighten up, but this causes discomfort in the left side of the neck. There are no vascular, motor, or sensory changes in the arms. X-ray plates show a cervical rib of the first degree on the left side (Fig. 93).

Under ether anesthesia the rib was readily removed using the technic which I shall describe in a moment. The patient made an uneventful convalescence, receiving no sedative at any time. She returned to her former occupation without distress.

Our second patient is a housewife, aged thirty-six years. For the two years preceding her first appearance in this clinic



Fig. 93—Roentgenogram in case of Miss A. H., a switchboard operator who was compelled to give up work because of pain in the left shoulder and side of neck. Note cervical rib on left side.



Fig. 94—Roentgenogram showing bilateral cervical ribs. First degree. Symptoms more distressing on the side of the right thoracic rib. Right rib removed. Left rib not operated on.

she complained of increasing discomfort extending from the neck into the arms. The arms tired more readily than formerly. There was pain in the right arm and discomfort in the left arm after attempting the usual household tasks. The inconvenience became so marked that the patient attempted very little. The discomfort did not extend to the fingers. There was no atrophy of the intrinsic muscles of the hand. There were no vascular motor or sensory changes in the hands or arms. Physical findings were normal otherwise. x Ray showed bilateral ribs of the first degree (Fig 94). The left rib was the longer.

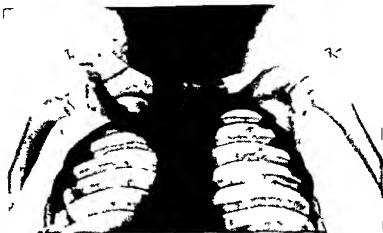


Fig 95—Roentgenogram of Master A. T. Note well developed cervical rib of the first degree on the left side.

The right rib was removed. The patient suffered rather severely for one week following operation. Two months following operation the pain was entirely gone.

I have here the case histories of 5 other patients whom I have operated on for this condition and in order to give you a better conception of the various phases of the cervical rib syndrome I shall read a brief outline of each case with remarks on its salient features.

CASE III—A. T. four years of age. Patient does not raise left arm above the horizontal. The arm can be raised through

normal range by passive motion. The child protests when urged to elevate hand above the head. Mother noticed a mass in the left side of the root of the neck during infancy. x Ray examination showed a long rib extending downward and forward (Fig 95). The rib was outlined readily by palpation. The rib was removed with some difficulty due to the smallness of the structures. One year after operation a verbal report stated that the child was raising the hand aloft in a normal manner.



Fig 96—Roentgenogram in case of Miss A. V. The plate was made after operation and shows defect following resection of a portion of the shaft of the first rib. In this case the pain was greater on the side of the short cervical rib which was not removed.

CASE IV—Miss A. V. age nineteen. Switchboard operator. For a year before entering the hospital the patient gave symptoms suggestive of hyperthyroidism. There is a record of rapid heart nervousness and tremor. Four months previous to admission to hospital patient noticed pain in the right side of the neck and the right arm. A swelling in the right side of the root of the neck was noticed by the patient. A slight enlargement of the right lobe of the thyroid was evident. The distress in the neck and arm became more severe and more constant. If he gave up her work

at the switchboard the pain diminished but returned each time she took up her work again. Examination showed slight symptoms of hyperthyroidism enlargement of the right lobe of the thyroid and a resistance in the right side of the neck suggestive of a cervical rib. An x ray plate showed bilateral cervical ribs with the larger rib on the right side (Fig 96). Under general anesthesia the first rib was resected and the artery and brachial plexus were dropped into the defect. This was done with the idea of avoiding traumatism of the plexus which had resulted when the plexus had been pulled on too severely in a previous case. The symptoms were relieved by this technic. The pleura was opened while the rib was being isolated previous to removal. No serious results followed. The patient has been under observation for six years following operation. There has been no recurrence of pain in the arm or neck. The symptoms of hyperthyroidism have gradually disappeared.

CASE V—Miss H. M. age twenty three. Two years before admission to the hospital the patient first noticed dull intermittent distress in the left side of the neck in the left shoulder and arm. The discomfort would disappear for two or three weeks at a time. In the last ten months the pain has been continuous and of increasing intensity. In the last few months the patient has noticed a gradual failure of the grip in the left hand. Only by increased effort could she retain an object in the hand. There was no complete paralysis present. History and physical findings were otherwise negative. Under general anesthesia the subclavian artery brachial plexus and seventh cervical transverse process were exposed. The tip of the transverse process was removed (Fig 97) and also a mass of connective tissue bands extending from the process to the first rib. The connective tissue bands passing under the brachial plexus were apparently a part of or associated with the scalenus medius muscle. To carry out the procedure the brachial plexus was displaced forward and backward several times. Following the operation the patient suffered greatly—morphin was necessary. There was the usual area of anesthesia on the shoulder down to the beginning of the circum

flex distribution in the upper arm. There was a moderate degree of hyperesthesia in the distribution of the musculocutaneous and internal cutaneous nerves. Tactile and pain sense were otherwise normal throughout the arm and hand.

Motor function was greatly disturbed after operation. Ulnar motion was lost. There was inability to adduct and abduct the finger—ulnar motion of the thumb was gone. The flexor carpi ulnari was functionless. The musculo-spiral was involved and there was almost complete wrist-drop and absence of extension of



Fig. 9. Roentgenogram in the case of M. H. M. The plate was made after the left transverse process had been removed.

the finger. The median motor function was about the same as previous to operation. The patient was in the hospital five weeks. The pain had disappeared and ulnar and musculo-spiral motor function were returning upon removal. The paralysis was doubtless due to stretching of the plexus. This patient returned in two weeks with the same condition on the right side. The same treatment was used. There were no postoperative complications as before. The patient three years after the second operation reports herself in normal condition.

CASE VI—Miss T V age thirty four Dressmaker For some months the patient has had increasing pain in the left side of the neck and in the left shoulder and arm This is present most of the time Earlier there was an intermittent discomfort in the same region Examination showed a bone like mass in the base of the neck on the left side In front of the mass there was a distinct pulsation—a greater force than is customary in this region A thrill was present There was a marked lessen

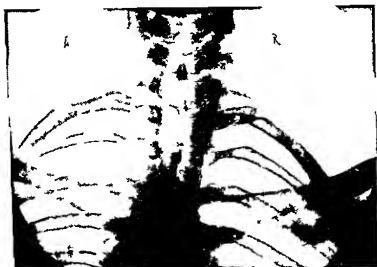


Fig 98—Roentgenogram in the case of Miss T V The symptoms were on the side of the left or larger rib

ing of power in the left arm There was dilatation of the pupil on the same side as the tumor Blood pressure systolic right arm 116 left arm 106 diastolic equal on both sides Physical examination showed normal findings otherwise x Ray examination showed a cervical rib of the second degree (Fig 98) At operation the bony portion of the rib extended to within 1 inch of the thoracic rib The anastomosis was completed by a section of cartilage curving back in such a manner that a recess was formed in which lay the subclavian artery The rib was removed in the

usual manner. There was increased weakness in the arm and hand for several weeks after operation but no pain. One year after operation the arm and hand were normal and the pupils were equal. This patient had been advised that an aneurysm of the subclavian artery was the cause of her discomfort.



FIG. 99.—Roentgenogram in the case of Mrs. M. D. Cervical ribs of the second degree in position articulation with the first thoracic ribs. The symptoms were on the side of the right or posterior rib.

CASE VII. Mr. M. D. age twenty-seven. History. Present complaint. Discomfort in right shoulder and right side of neck. Swelling in side of neck. Patient states that six years ago a swelling was found in the right side of her neck. In the last year she has noticed a discomfort when pushing with her right arm or when lifting or reaching above her head. The right hand and arm are more troublesome in cold weather than in warm.

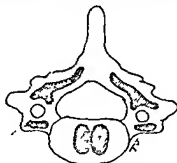
Physical examination shows normal findings throughout, except for the condition in the neck. When the head is thrown backward there are swellings in the neck 1 inch above the midportion of the clavicles. On the right side the mass is somewhat painful on pressure and there is a distinct thrill in the pulsating vessel passing in front of it. Back of the pulsating area a rounded cord passes diagonally downward and laterally over the mass. Pressure on this cord causes pain in the arm and hand. α Ray examination shows bilateral cervical ribs (Fig 99). On the left side there is a long straight rib the distal end of which is lost in the shadow of the first thoracic rib. On the right side is a somewhat shorter rib which drops from the seventh cervical transverse process to the middle of the first thoracic rib articulating with a tubercle-like protrusion. Under general anesthesia the right rib was removed in the usual manner. The rib was $1\frac{1}{2}$ inches long and had the structures of a true rib. The distal end of the cervical rib was slightly movable on the first thoracic rib. The end of the cervical rib was cartilaginous. It was attached to the thoracic rib by firm connective-tissue bands. The patient was entirely free from pain on leaving the hospital. She received no sedative during convalescence.

DISCUSSION

Medical literature for two hundred years records the presence of neck or cervical ribs. In the last fifty years more accurate clinical records have been made. With more accurate diagnosis made possible by the α ray there has been a greater knowledge of the variation in symptoms. Early cases were recognized only where symptoms or findings were pronounced and characteristic. Now with the earliest onset of symptoms the Roentgen plate is used to verify the presence of an accessory rib.

Certain lower forms of animal life normally have cervical ribs. The presence of this type of rib in the human is explained by some on the basis of atavism. The seven cervical vertebrae differ from the first thoracic vertebra in that the cervical transverse process possesses an opening known as the foramen transversarium for transmission of the vertebral artery and vein. The

anterior portion of the process known as the anterior root is described as the costal process at times. This costal process



Separate ossification centers in anterior root

Fig 100 (Diagrammatic) —The transverse process of the seventh cervical vertebra shows two centers of ossification instead of the one found in the first thoracic transverse process. One of these centers forms the anterior root of the transverse process, which is in reality a fused rudimentary rib.

arises by a separate center of ossification in the seventh cervical vertebra, and occasionally in the fourth, fifth, and sixth cervical

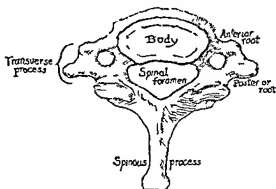


Fig 101 —Sketch of seventh cervical vertebra as seen from above. The anterior root of the transverse process is in reality a fused rudimentary rib.

vertebræ (Figs 100–102). With the growth and prolongation of the costal process, which is really a fused rudimentary rib

there results a supernumerary or cervical rib. The transverse process of a thoracic vertebra has but one center of ossification corresponding to that in the posterior root of the transverse process of the seventh cervical.

Cervical ribs have been divided into false and true ribs. The latter have a shaft, neck, and head, and articulate in the manner usual to the thoracic ribs. False cervical ribs consist of a shaft merely, and articulate with the tip of the transverse process only.



Fig. 102.—Sketch illustrating relative prominence of transverse process of seventh cervical and neighboring vertebrae. The tubercle of the seventh transverse process (see arrow) is a convenient landmark on the neck. In case one comes down on the sixth transverse process (carotid tubercle) rather than on the seventh, the former is readily recognized by the fact that the edges fold up and form a deep groove, while the transverse process of the seventh flattens out.

Four groups of cervical ribs have been described by Gruber. The first extends out into the neck with the distal end free (Fig. 103-1); the second group articulates with the shaft of the first thoracic rib (Fig. 103-2), while the third is attached to the sternum with a cartilage common to it and the first thoracic rib (Fig. 103-3); the fourth type is attached to the sternum by its own distinct cartilage (Fig. 103-4). The majority

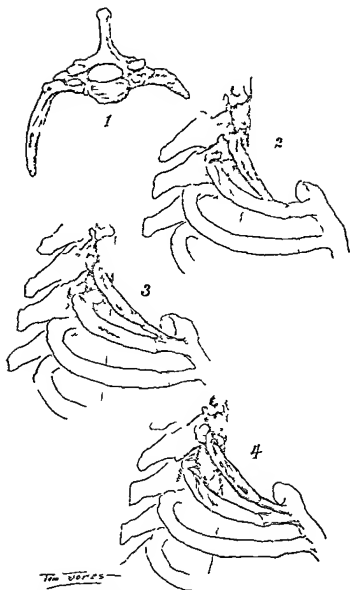


Fig 103—Sketch illustrating the four degrees of cervical rib (see text)

of cervical ribs belong to groups one and two but of these the second group is more common. The attachment to the first rib is most varied. It may consist of a fibrous band, a cartilaginous attachment, or a combination of the two, quite suggestive of a joint, and finally bony synostosis is seen. Early English anatomists have described the distal end of the rib as above, and in addition have reported cases in which the rib itself has consisted of irregular groupings of bone, cartilage, and fibrous tissue, suggesting an incomplete embryologic development.

Approximately 1 per cent of the dissecting material in anatomic laboratories shows some form of cervical rib. Judging from the clinical aspect, very few of these ribs cause enough disturbance to suggest their presence. The literature shows that these ribs are found more frequently in women than in men, more frequently bilateral than unilateral, and when unilateral, more frequently on the left side than on the right side. When two ribs are present, the left is more frequently the larger. Symptoms seem to be present about as often on the side of the smaller rib as on that of the larger one.

The symptomatology and findings are grouped under three headings:

- (a) The presence of a visible or palpable tumor in the neck
- (b) Vascular phenomena
- (c) Nervous disturbances, sensory, motor

The tumor in the neck is seldom visible; at times it is as large as a walnut. One case had been diagnosed as osteoma of the first rib because of the marked elevation of the mass. Palpation of the shaft or end of the rib is quite simple in some cases, while at times it is impossible to determine whether it is a cervical or thoracic rib.

The vascular symptoms are usually referable to the arterial supply, as might well be imagined from the relations of the rib vessels and scalene muscles (Fig. 104). You will recall that the relation of the structures involved from before backward are the subclavian vein, anterior scalene muscle, subclavian artery, and brachial plexus. These structures are never under a seventh cervical rib. A simple form of disturbance is that

caused by the artery passing over the cervical rib, or, what is more common, passing in front of the end of the rib in such a manner that a thrill is present, so that sometimes the mistaken diagnosis of aneurysm is made. The thrill was quite prominent in two of our cases.

Narrowing of the lumen of the artery has resulted in diminution or loss of the radial pulse on the affected side. Several

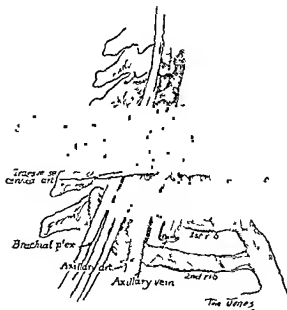


Fig. 104.—Sketch showing the deep surgical anatomy of cervical rib. The brachial plexus has been pulled backward to give a better view. A rib of the first degree frequently remains proximal to the artery.

patients have observed that there is more distress in the winter than in warm weather. Holding the hands and arms in cold water often causes greater discomfort and blanching of the skin on the affected side. This temporary ischemia is sometimes made use of as diagnostic aid. Both hands are plunged into cold water and then held aloft. The pallor disappears more

slowly from the side in trouble. Some patients wrap the arm in special covering to avoid the discomfort that results if the arm is accidentally left uncovered. One patient who worked in an ice-cream factory found that he could not handle the cracked ice with the hand that was on the side of the disturbing rib. Gangrene is reported from complete loss of blood supply due to thrombosis following pressure. Aneurysm of the subclavian has resulted from injury to the artery at the point of contact with the rib. The onset of arterial disturbance is so gradual that collateral circulation usually develops before serious vascular failure results.

Disturbances on the side of the nervous system are more frequent than those of the circulatory system. These disturbances may be purely sensory but are frequently associated with motor changes. Very rarely are the symptoms purely motor. The greater frequency of nervous symptoms is of course due to the relative position of the brachial plexus and artery. A short cervical rib of the first degree might press upon the plexus and not reach far enough downward and forward to disturb the artery.

The nervous symptoms rarely occurring before adolescence are most frequently seen between the ages of twenty and forty years. Use of the arm is the most frequent cause of the appearance of nervous symptoms. Carrying a heavy weight with the arm at the side is a frequent cause of disturbance. This is due to traction on the plexus over or against the end of the rib. Working with the arm in an extended or elevated position will cause symptoms in some cases. One patient, an operator of a telephone switchboard, could not continue work because of the pain caused by stretching out the arm in an effort to complete connections.

Another patient, a professional pianist, found that prolonged practice caused weakness and pain in the arms.

The symptoms referable to the nervous system may be slow or rapid in onset, varying from months to years. They vary greatly in intensity, increasing, diminishing, and disappearing at intervals. The sensory symptoms vary from slight paresthesia

to the most intense pain. Anesthesia or hypesthesia are not common.

The motor or muscular changes are not so common as the sensory. The arm tires more readily than normally. The power in various muscle groups is diminished. Atrophy is not uncommon. Complete paralysis is seen but is very rare. The motor changes are seen most frequently in areas supplied by nerve-fibers from the eighth cervical and first thoracic roots. Various symptoms referable to the sympathetic system are described. In our series but one patient showed sympathetic disturbances. These were dilatation of the pupil on the same side as the disturbing rib and hoarseness when the patient was tired. These disappeared some months after operation.

Dr. Joseph Miller has called attention to the fact that in some cases there is a definite picture of cervical rib disturbance but no rib is seen in the x ray picture. He has suggested that if these symptoms persist for a year or longer and do not respond to general treatment, it is advisable to do an exploratory operation. At times a short rib is found the shadow of which has been superimposed upon the shadow of the transverse process of the seventh cervical vertebra. At times a tendinous band may extend from a short rib or from the seventh transverse process to the first thoracic rib. Within this tendinous band islands of cartilage may be found suggestive of an undeveloped anlage of a cervical rib. The brachial plexus may be stretched over this tendinous band in such a manner as to give symptoms. Acting on this suggestion complete relief was obtained in a patient who showed unilateral symptoms but no cervical rib on x ray examination. The patient went through a very painful convalescence of two months duration. A year later symptoms developed on the opposite side. Because of the unpleasant convalescence the patient endured the discomfort for one year before reporting for operation. Again no rib could be found by x ray examination. A number of connective-tissue bands suggestive of strong fascia were removed and the patient obtained complete relief.

Operation.—Two methods of approach have been suggested

By the first method an incision through the muscles of the back down to and at right angles to the transverse processes of the seventh cervical and first thoracic vertebræ is used. The accessory rib is exposed and removed after severing the seventh transverse process. This procedure is far more difficult and seems more dangerous than the anterior route. An easier exposure is given by an angular or curved 3 inch incision the lower



Fig 105 —Incision for removal of cervical rib

half of which is parallel to and $\frac{1}{2}$ inch above the clavicle the upper half extending upward and parallel to the anterior border of the trapezius (Fig 105). The platysma and fascial layers are opened and the vessels and plexus exposed. When ribs of the first and second degree are concerned it is not necessary to carry the dissection forward enough to expose the subclavian vein which lies anterior to the scalenus anticus muscle. A rib of the second degree not infrequently carries the subclavian

artery upward in an exaggeration of its normal arc. In these cases one feels more comfortable with the scalene muscle exposed. The phrenic nerve is seen on the front of the scalenus anticus but is well out of the field. The brachial plexus passing over or in front of the tip of the rib is usually in such a position that it is necessary to swing it forward and backward to free the rib for removal. As little displacement as possible of the plexus is advisable as pain and transient paralysis of varying degree result from too free manipulation of the nerve trunks.

In one case flattening of the muscles of the back of the scapula and interference with the function of the arm resulted from accidental injury to the suprascapular nerve. This nerve lies high in the operative field and should not be exposed as a rule. The upper angle of the wound may expose the spinal accessory nerve as it enters the trapezius muscle. The periosteum must be removed with the rib as the literature reports reformation of bone from periosteum that has been left in place. Removal of the shaft is usually sufficient to relieve symptoms. Removal of the neck of the rib increases the difficulty of the operation greatly, and frequently gives rise to severe hemorrhage.

In one instance we resected the first thoracic rib and dropped the plexus and subclavian artery into the defect to avoid the pressure of the cervical rib (Fig 96). This resulted in complete relief. This technic does not seem advisable however as the pleura is readily opened either by an instrument or by a bone fragment. The pleural cavity was opened accidentally in the one case in which the first rib was resected. The dangers associated with opening the pleura seemed greater than the stretching of the plexus and for this reason I have not repeated the procedure.

Following operation there is in some cases anesthesia of the skin over the shoulder in the region between the incision and the area in the upper arm supplied by the circumflex nerve. This may be avoided by saving the branches of the cervical plexus as they pass across the field of operation. This anesthesia disappears in a few months.

CLINIC OF DR LEIGH F WATSON

RUSH MEDICAL COLLEGE

LOCAL ANESTHESIA FOR INGUINAL HERNIOTOMY

Summary Inguinal herniotomy from the standpoint of the technic of local anesthetics. Detailed account of the preparation of solutions the choice of needles the preparation of the patient and the progress of the anesthesia during the various steps of the operation

TODAY we shall take up the operation for hernia from the standpoint of the local anesthetist. I shall show you how we get ready for an operation under local anesthesia, the solutions we use the needles that are best and shall operate on a patient who has a double oblique inguinal hernia.

I want to give you a very brief sketch of the progress that has been made with local anesthesia during the last thirty five years. The development of the modern technic probably dates back to Koller's spectacular demonstration of cocaine anesthesia of the cornea before the Ophthalmological Congress in 1884. Within a few months cocaine anesthesia was tried in a variety of operations by surgeons throughout the world among whom were the American pioneers Hepburn Hall Halsted and Corning. Halsted very early recognized the importance of intradermal infiltration for skin anesthesia instead of the generally used hypodermal method.

On account of the strong solutions employed by these early investigators toxic symptoms often resulted and sometimes death occurred. As early as 1884 Reclus urged the use of solutions no stronger than 1 per cent and Corning demonstrated that complete anesthesia followed the injection of $\frac{1}{2}$ of 1 per cent solution. In 1887 Schleich used $\frac{1}{2}$ of 1 per cent and even $\frac{1}{8}$ of 1 per cent satisfactorily, and a few years later he re-

ported that 90 per cent of his operations were being done under local anesthesia

By 1887 a large number of herniotomies had been attempted by surgeons in widely separated localities, with more or less success. The general method was to infiltrate all tissues in the field of operation. Cushing in 1897 advocated exposing the nerves supplying the hernial region and directly blocking them. This was the most important advance in the technic of cocaine anesthesia since the introduction of the diluted solutions by Reclus and Schleich. In 1899 Cushing reported 49 operations for non-strangulated hernia done by Halsted, Bloodgood, and himself. Fourteen of these patients were over sixty years of age, the oldest being eighty-four. Bevan also did 50 or more hernias and continues to recommend local anesthesia in quite a proportion of cases, urging it almost without exception in the strangulated type. About this time Wyeth and Bodine began using cocaine in $\frac{1}{2}$ of 1 per cent. for skin and nerve trunks, and $\frac{1}{16}$ of 1 per cent elsewhere. In 1917 Bodine estimated that they had performed over 3000 herniotomies without a fatality, and with as high a percentage of permanent cures as follows:

With the advent of novocain in 1905, and more recently apothecin, non-toxic substitutes the dangers of poisoning from the anesthetic have been practically eliminated and the development of the details in technic have enabled us to use local anesthesia wherever the whole field of operation can be anesthetized. Patients have been educated into believing that they must be asleep during a major operation; that consciousness is synonymous with pain. However we find that many individuals welcome the opportunity of avoiding a general anesthetic when they are assured of a painless local operation; they are most appreciative of good work, and our records show that each year we are doing an increasing number of major operations under local anesthesia.

When shall we use local anesthesia in hernia? Assuming that the patient is an ordinarily good surgical risk and that he has had the general facts explained to him, he certainly has a right to select his own anesthetic. It is always a mistake to urge local

when for any reason the patient prefers to be asleep. Local anesthesia is usually contraindicated in highly nervous subjects and in children although I have frequently operated on patients from nine to twelve years of age with very happy results. The confidence of any patient must be secured early and maintained throughout the operation. The surgeon must not become so engrossed in his work that he neglects for an instant the primary consideration—the comfort of his patient—who has been assured that the operation will not hurt. Local anesthesia is successful only when it is painless.

The local method for herniotomy adds greatly to the comfort of the young and robust and in the presence of old age shock hemorrhage strangulation pulmonic nephritic or cardiac lesions I usually insist upon it. Reclus says the hernia operation is the triumph of local anesthesia.

Anesthetic Solutions—Now we will discontinue this general discussion and prepare the solutions for our patient who is a middle-aged man with a reasonably large right hernia and a small one on the left side. We will do one operation under procain (American novocain) and the other with apothecin. Both drugs can be purchased in tablet form and I use either in a strength of $\frac{1}{2}$ of 1 per cent solution. As you know these drugs are comparatively non toxic in ordinary amounts and are probably safe if you do not inject more than 8 to 10 grains distributed over the period of an hour. For the first operation we will use procain (novocain) $\frac{1}{2}$ of 1 per cent solution. I have had the nurse boil a test tube and a couple of 1 ounce medicine glasses. No one is allowed to touch the tablet. We remove the cork and shake a 48 grain tablet out on a piece of sterile gauze and then into the test tube. I now take a sterile medicine dropper and add 10 minims of adrenalin chlorid solution (1:1000) to the tablet in the test tube and half fill the tube with sterile normal salt solution and boil over a flame for three minutes. We pour half of the contents of the test tube into one of the medicine glasses the remaining half into the other glass and we add enough normal salt solution to make 1 ounce of anesthetic in each glass.

With each glass containing 2.4 grains of anesthetic it is easy to estimate at any time during the operation just how much has been used. I want to call attention to the importance of dissolving the anesthetic tablet in normal salt or Ringer's solution if you expect to secure the best results. We will come back to this point later on because there are some things I want to emphasize.

We will now mix the $\frac{1}{2}$ of 1 per cent. apothecin for the second operation. It is prepared the same way as the procain (novocain) solution. In using apothecin remember it is precipitated by sodium bicarbonate and alkali and if the test tube, medicine-glasses, syringes and needles are boiled in sodium bicarbonate or alkali before using they must be rinsed out with plain sterile water or normal salt solution.

Syringes and Needles—The selection of a suitable syringe depends largely upon the preference of the operator. Bodine always used a 2-dram glass syringe. The massive infiltration apparatus of Matas and Farr's pneumatic injector are valuable aids when a large field is to be infiltrated. For the patient we are about to operate on I will use a 12 c.c. all metal syringe. This type of syringe is always ready, never gets out of order or breaks and it takes a slip needle. A hernia of this size usually requires about 40 to 60 c.c. of anesthetic solution and we will use two syringes so one will always be ready.

We will select two sizes of needles. This very fine one (No. 24) we will use only for the first injection of the skin and blocking the nerve trunks. For the succeeding injections we will take a needle somewhat larger (No. 20) with a strong shoulder. With this we can work rapidly and there is no danger of it bending or breaking. The needles have been kept sharp and bright by polishing them on a cake of Sapolio.

Preliminary Medication—The patient now receives $\frac{1}{4}$ gram of morphin sulphate hypodermically to quiet any anxiety and to put his mind at rest and make him indifferent to his surroundings and the progress of the operation. While we are waiting about fifteen minutes for the morphin to take effect I want to show you that we prepare the operating table for a

local anesthesia operation by padding with a couple of blankets. The patient says it is as comfortable as his bed at home. This is to prevent backache and that tired, restless feeling that comes over the local anesthesia patient after the first half hour spent on the average operating table. We are going to sit down while operating on this man, we can work most comfortably seated on high stools and it does away with one objection many have to local anesthesia—its tediousness. No one is allowed to lean on the patient or to rest his elbows on him.

Before beginning the operation I want to return for a moment to the discussion of the isotonic normal salt and Ringer's solution. Corning in 1815 discovered that anesthesia was more prompt when the solution was isotonic. Three years later Liebrich called attention to the fact that plain or distilled water injected into healthy tissues was irritating, that it would produce pain before anesthesia—"anesthetica dolorosa." Allen more recently has shown conclusively that healing is more rapid when isotonic solutions are employed in local anesthesia. With the patient's consent I will demonstrate to you the irritating effects of hypodermics of plain and distilled water. Watch his face while I inject 5 minims of plain boiled water. He winces and complains of a cutting knife like pain the moment the injection is made. Just above the first injection I make another of plain distilled water. He says it hurts as bad as the first one. Now I inject 5 minims of normal salt solution. He smiles and says it doesn't hurt a bit. The same pleasing result follows an injection of Ringer's solution. The use of an isotonic solution not only promotes prompt healing but also actually adds to the success of the anesthesia because it provokes no pain when injected. As you know, the anesthetic itself does not take effect for at least five minutes.

The field of operation has been prepared in the usual manner. The line of incision lies $\frac{1}{2}$ inch internal and parallel to Poupart's ligament. It extends from about 2 inches above the internal ring to the upper part of the scrotum just below the external ring. So that the infiltration will be made straight I mark the line of incision with an ordinary soft lead pencil that has been

bouled with the instruments, first moistening the point with sterile water. We will take up separately the anesthesia of the skin, subcutaneous tissues, the deep nerves and the parietal peritoneum of the neck of the sac. Follow closely and you will observe just how the nerves in each layer are blocked.

Anesthesia of the Skin.—I will put a drop of phenol at the upper end of the line of incision, to act as a local anesthetic for the first injection. Ethyl chlorid is equally satisfactory for this purpose. I tell the patient that the first prick of the needle will hurt slightly. He says go ahead so I gently thrust the fine needle through the anesthetized area, steadying the skin by pinching it up between the thumb and forefinger, and the patient remarks that it didn't really hurt after all. I am holding the needle nearly parallel with the skin surface, the point is very superficial, just within the epidermis or scarf skin. Look carefully and you can plainly see the needle point intradermal. As you know, the terminal filaments of the sensory nerves are in the deep layers of the epidermis where we gently force the solution until a wheal the size of a dime is formed. The patient says it does not hurt, which is because our solution is isotonic. I push the needle forward about $\frac{1}{4}$ inch and form another dime-shaped wheal. We now change to the larger needle and continue the infiltration each time reinserting the needle through the edge of the last wheal. The patient says he does not feel it. The blanching effect of the adrenalin shows us just how far the anesthesia extends. The skin infiltration is completed and you see the series of wheals we have made have fused into a continuous line about $\frac{1}{4}$ inch wide. Because of the adrenalin we added to the solution anesthesia will last at least an hour so we need not hurry.

Anesthesia of Subcutaneous Tissues.—I will inject the subcutaneous tissues down to the aponeurosis of the external oblique before making the skin incision. It can be done quicker now and we will get a better anesthesia than if we wait until the skin is cut to make the infiltration. This time I insert the needle at a right angle to the skin and push it directly downward. As soon as it passes the epidermal layer I make gentle pressure on

the plunger to form a path of anesthesia right down to the aponeurosis. The needle is withdrawn for each of these infiltrations which are made about $\frac{1}{2}$ inch apart and deposit 10 to 20 minims at each point. We must now wait a few minutes for anesthesia to become complete. Right here I want to emphasize one thing—you must wait for anesthesia. If you begin too soon and hurt your patient you lose his confidence right at the beginning and you are liable not to regain it. Many operators fail with local anesthesia because they disregard this point.

We will handle the instruments quietly, and our operating room conversation must be such that it does not alarm or disturb the patient who is very much awake and asks that we talk to him while we are working. We will remember that gentleness in handling the tissues is one of the prime factors for success.

After waiting five minutes I test the anesthesia by touching the skin at different points along the line of incision with a needle each time asking the patient if it hurts. He does not feel the needle prick anywhere so we know that anesthesia is complete. I now incise the skin with a sharp scalpel which I will then discard and use a fresh one for cutting the subcutaneous tissue. The patient complains of the pressure of the scalpel being uncomfortable although there is no pain. Accordingly we will use only scissors for our dissecting during the remainder of the operation. You notice I have a small piece of gauze between the handles of the scissors to prevent any clicking sound which might make the patient nervous. Here you can see two small blood vessels running across the field. I am carefully freeing them from their minute plexus of nerves in the fatty tissue then there will be no pain when they are clamped between hemostats and cut. We will leave the hemostats on until the operation is finished and then the vessels will not need ligating. It is important to keep the field as dry as possible so that each layer of tissue can be easily recognized. Sponging is done lightly—the “velvet touch” method—instead of the swabbing style that is permissible under general narcosis but which causes pain with local anesthesia.

Blocking the Deep Nerves—We have now exposed the glistening aponeurosis of the external oblique. Using the fine needle I inject a few minims of the anesthetic beneath the aponeurosis just below the center of the incision where I believe we will find the ilio-inguinal nerve. The nerve lies on top of the internal oblique muscle and is often adherent to the aponeurosis. You must not cut it. As the solution is injected it forces its way from the aponeurosis and out of danger. Picking up the aponeurosis with anatomic forceps I carefully incise it for a distance of 1 inch. Retracting the edges you can see a small white cord running diagonally across the field—the ilio-inguinal nerve. I touch it with the forceps and the patient complains of a burning pain radiating down toward the scrotum. With the aponeurosis retracted I infiltrate a few minims of the anesthetic with the fine needle into the nerve sheath as high up on the nerve as possible. The ilio-inguinal nerve usually supplies nine tenths of the sensation in the inguinal region. Extending the incision in the aponeurosis upward we find the iliohypogastric about $\frac{1}{2}$ inch above the ilio-inguinal nerve. We block it high up as we did the ilio-inguinal. The iliohypogastric is not always found; sometimes it is absent and instead we find a large ilio-inguinal or vice versa. The ilio-inguinal and iliohypogastric anastomose near the anterior superior spine and for this reason it is always important to block both nerves when they can be found.

The incision in the aponeurosis is now extended down to the external ring. I pick up both nerves with anatomic forceps and the patient says he does not feel it. Thus is our sign of complete anesthesia. We ask the patient to cough and the sac bulges up into the wound and is easily located. We will do a modified Bassini operation that has given over 90 per cent of cures. The sac is very adherent to the cord and instead of stripping it off with gauze which might cause pain we free it by sharp dissection with scissors up to the internal ring.

Anesthesia of the Neck of the Sac—Opening the neck of the sac we inject a few minims of the anesthetic into the parietal peritoneum at the internal ring. This is necessary because the

parietal peritoneum is very sensitive and is not innervated by the ilio inguinal or iliohypogastric nerve. I ligate the sac high so that when it is cut off the stump disappears by the elasticity of the peritoneum and I free the cord preliminary to transplanting it. In some patients the cord is short due to an incompletely descended testicle when before freeing the sac it is often advisable to block the genital branch of the genitocrural nerve which runs along the bottom of the inguinal canal or on the posterior surface of the cord. It is not necessary to search for this nerve a couple of deep infiltrations at the upper part of the cord will permit a painless transplantation. However in this case the cord is of normal length and we need not concern ourselves with the genitocrural. With the cord freed I place the deep sutures just as if the patient were under general anesthesia. I like to separate the inner flap of the external oblique aponeurosis for a distance of a couple of inches from the internal oblique muscle to provide plenty of room for the cord structures. This avoids the postoperative swelling of the cord and epididymis which occasionally follows the regular Bassini operation and at the same time it makes the patient's convalescence more comfortable and minimizes the danger of atrophy of the testicle. We overlap the aponeurosis close the subcutaneous tissues in the usual manner and use a running subcuticular suture for the skin.

The operation has consumed an hour's time and we ask the patient if he wants the other side done now or in a few days and he says to do it now. Our apothecary solution is ready and we proceed with the same technic as in the first operation. By the time we come to the closing of the wound the patient has become tired waiting for us to finish and has fallen asleep. This smaller hernia has consumed only a half hour. I always operate on the larger side first while the patient is fresh.

I want to mention one point regarding large or complicated hernias. Sometimes the operation lasts longer than the anesthesia in the skin. If the patient become restless and complains of a vague general soreness in the wound it is a good sign that cutaneous sensibility has returned. It takes but a couple of

minutes to reanesthetize the skin by injections under the cut edges and the patient is again quiet and comfortable

The operation finished the patient is returned to his bed and as he remarks that he is hungry he will have a bowl of hot thin soup or a cup of coffee. He will be kept comfortable with morphin or codein. For the prevention of gas pains he will receive 5 grains of salol every four to six hours and $\frac{1}{2}$ ampule of pituitrin with atropin sulphate (grain $\frac{1}{300}$) every three hours for about eight doses. He is encouraged to turn on either side and move around in bed as much as he will. Heat over the abdomen aids peristalsis. He will receive a cathartic this evening and an enema in the morning.

CLINIC OF DR. HUGH N. MACKECHNIE

FRANCES WILLARD HOSPITAL

SILENT APPENDICAL ABSCESES IN CHILDREN

Summary Diagnosis and treatment of appendical abscess in children. Related postoperative conditions demanding surgical interference.

THIS patient, aged seven years, complains of pain in his right iliac fossa which prevents him from eating as he wishes and also keeps him from playing with his usual vim. Five days ago he came home from school complaining of a stomach ache attributed to a kick in the abdomen, to wet feet and to eating freely of candy in the morning. He vomited once. He remained home in the afternoon and rested. During the evening he appeared feverish but his temperature was not taken. The next morning he felt better and insisted on going to school. He ate a good breakfast and went to stool as usual. During the day his side hurt him and he came home with considerable stomach ache. He was kept in bed Friday, Saturday and Sunday but the pain did not go away. His appetite has grown poor and on Sunday he appeared slightly feverish. Temperature was not taken.

Today, five days after his first complaint, I was called to see him and found him flushed but quite bright and cheerful, a tense expression, tongue red on edge and brown coated, dry in center, temperature 100.4° F, pulse 96, soft, full and compressible. Chest was clear, heart sounds good. Abdomen was full and rounded. Right rectus muscle was quite tense while the left rectus muscle was fairly soft. At McBurney's point there was marked sensitiveness and apparently a smooth, round mass deeply placed. Leukocyte count was 14,500, no differential count made.

A diagnosis of appendical abscess, possibly retrocecal in origin, has been made and I am about to operate on that diagnosis

Operation—On opening the abdomen a mass the size of an orange covered by omentum comes to view. This we open, thus releasing a large quantity of fecal pus. The appendix is not easily found, and will be left to slough off with drainage or be removed at a later date. A tube with gauze is placed in the wound and the layers sutured around it. If it were readily found the appendix would be removed provided this could be done without much traumatism or disturbance of the limiting exudate.

Postoperative Note—The patient made a good recovery and drained for three weeks. It is very doubtful if the appendix came out with the drainage.

Two conditions may arise in these cases necessitating future surgical interference. The original infection may not have been sufficiently severe to destroy the appendix or the drainage-tube may not have been left in long enough to give time for the primary infection to die out. As a result a secondary attack may develop at any time and demand operation. If such should occur, early attention would make possible first, the removal of the appendix and the secondary focus and second the removal of the scar tissue formed from the drainage. Early attention would permit of such radical and clean work that no drainage would be necessary. Again from the large amount of scar tissue and adhesions forming in these cases we may have ileus develop to a greater or less degree. It may be such as slightly to disturb digestion, produce constipation or dilatation of the gastrointestinal tract, or be in the nature of a complete obstruction. Any of these conditions may grow so annoying or acute as to demand surgical relief. In such cases the scar tissue with the appendix may be removed and the abdomen closed without drainage.

The case just operated on resembles closely another one of recent occurrence. The history of the second case is as follows. A boy aged eleven years came home from school with a severe

stomach ache. He had vomited while at school. The family physician was called and gave him a digestant laxative mixture. He ate no supper. His bowels were regular and had moved during the morning. During the night the pain decreased and next morning the patient was much better. He did not wish to go to school and remained in bed. His appetite was good and he was allowed to eat in moderation. On the fifth day because he appeared flushed, had no appetite and continued to have soreness in the side I was called to see him.

Examination showed a well nourished boy, bright and cheerful and somewhat flushed. Tongue was coated brown and dry in the center and red on the edges. Temperature was 101.2° F and pulse 110. White blood count was 15,300. Chest was clear and heart was good. Abdomen was rather rigid especially on the right side and tympanitic. There was a noticeable mass just above the pubes in the center and to the right which was quite sensitive. There was no marked mass in the right iliac fossa. Rectal examination showed a mass in the pelvis which was rather soft and quite sensitive.

A diagnosis of ruptured appendical abscess reformed in the pelvis was made.

This diagnosis was verified at operation. The appendix was found lying in the iliac fossa on the wall of the abscess. It had sloughed off $\frac{3}{4}$ inch from its base. The distal portion was attached to the meso appendix and its blood supply. The abscess was in the pelvis and not in the iliac fossa. The appendix was removed and the abscess drained.

At the end of three weeks it healed and recovery was excellent.

These 2 cases are illustrative of what so often occurs in children. The appendix ruptures early without the marked pain usually found in adults in an acute condition which goes on to rupture. A slight stomach ache, a little distress pain as from a blow may in these little ones presage a more serious condition than the symptoms indicate. The infection tends to wall off and become localized. This does not always occur. Fortunately the youthful tissues react very strongly, an exudate

is produced which walls off quickly absorption decreases and the symptom-complex is not of a violent type

Children frequently are up and about with conditions which would hospitalize an adult. In an adult the pain and tenderness in these cases would not be borne without complaint. Possibly the realization of danger makes the adult more cautious but it is a fact that he will not persist in going around in such conditions as will the child. These things should be borne in mind while examining children and due allowance made when summing up a case for diagnosis.

FOREIGN BODY IMPACTED AT ILEOCECAL JUNCTION

Summary Surgical pathology and cat on s for operat on and prognos s of impact on of non-occlud ng fore gn body n ntest ne

THIS little girl swallowed a small gold baby pin while being undressed four days ago. The mother distinctly remembered shutting the pin as she took it out of the clothes and laying it down. I was called to see the baby and advised a voluminous rather solid diet in the hope that the pin would pass through without complications. At the end of twenty four hours we took a skia graph to ascertain its whereabouts and found it in the region of the ileocecal valve apparently across the opening. We waited two days more during which time the stools were carefully examined. Signs of developing peritonitis due to perforation or of obstruction were watched for but not found. Another skia gram was taken and the pin was found apparently in the same place (Fig 106). This being the case it has been felt best to operate because first the pin has made no progress in two days second it appears to be across the ileocecal valve and might at any moment produce acute ileus third it may cause necrosis of the intestinal wall with rupture and peritonitis and possible death fourth it may by pressure necrosis work its way through the ileocecal valve and produce a resultant cicatrix at this point which may in turn cause chronic ileus.

A right rectus incision as for appendectomy will prove best for our purpose. The ileocecal junction is brought up and the pin is readily located. It is placed transversely to the ileocecal opening there is some plastic exudate on the peritoneum at the ileocecal junction where pressure is greatest. There is no extensive peritonitis. The mucous membrane and muscularis feel thin at that point but there is a thickening of serosa and subserosa. I open the ileum at a point free from pressure and remove the pin. The valve is quite open in an apparent effort to

stretch and let the pin pass. The mucous membrane of the ileum where the pin was pressing is being destroyed. It is worth noting these things because the prognosis as to morbidity depends on the extent of the trauma. The wound in the ileum is closed with two layers of silk applied longitudinally. It is



Fig. 106. Roentgenogram showing shadow of pin in ileocecal region.

not necessary to reinforce the points of pressure. The abdomen is closed by layer suture.

The prognosis as to mortality is good. Without unforeseen mishap this child will get well. As to morbidity we should expect none. There has not been sufficient trauma or plastic exudate to produce a cicatrix with contraction and consequently

no ileus should develop. Children of this age frequently develop protrusion at the abdominal incision because of the poor muscle and fascia development and because of the inevitable crying and straining that follow an operation. If they are kept tightly bandaged with a small compress over the incision for a time the tendency to hernia will be minimized.

CLINIC OF DR ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

CARCINOMA OF THE STOMACH—ANTERIOR GASTRO ENTEROSTOMY

Summary Massive carcinoma of the stomach—treatment Anterior gastro enterostomy when indicated Technic—necessity of a long jejunal loop Postoperative management—castor oil and sodium bicarbonate as exciters of gastric peristalsis Clinical pathology of leather bottle stomach

The second case that I shall present to you this morning is a patient of Dr Abbott's Dr Abbott has studied the case and gives us the following facts

The patient comes complaining of stomach distress There is no marked pyloric obstructive symptoms Examination of the stomach contents shows absence of free hydrochloric acid and the presence of blood There is also blood in the stools *x* Ray examination shows a large filling defect at the pylorus There is a definite palpable tumor to be felt a little to the right of the median line and just below the costal arch and the xiphoid The man has lost 20 or 30 pounds in weight He gives no history suggestive of stomach or duodenal ulcer The Wassermann is negative The clinical diagnosis is carcinoma at the pylorus possibly operable

The operation which we shall undertake is exploratory in the sense that it will determine first the diagnosis and second the method of surgical procedure which should be adopted Although the clinical diagnosis is probably 95 per cent in favor of carcinoma at the pylorus one would have to admit in a group of these cases the possibility of a massive ulcer producing these symptoms and this an exploratory will be required to determine then if we find let us say that the lesion is a carcinoma we must

decide whether it is wise to resect do a palliative operation, or make the operation purely exploratory and close without doing anything further

The patient is now etherized and I want to call your attention to the incision we shall make here. Beginning in the angle between the ensiform cartilage and the left costal arch and a little to the left of the median line we carry our incision down a little to the left of the median line to just above the level of the umbilicus. We go to the left of the median line in order to avoid the round ligament of the liver. Dividing the skin and superficial fascia and the anterior sheath of the rectus the posterior sheath of the rectus and the peritoneum we now open freely into the peritoneal cavity. The left lobe of the liver first comes into view at the upper angle of our incision and then the stomach. As I draw the stomach out you see that we have to deal with a very large carcinoma much larger than I imagined from physical examination of the patient or from the x ray pictures. This carcinoma begins at the pylorus and does not involve the duodenum it is about 2¹/₂ to 3 inches in diameter. *The main mass is about 3 inches in length that is it extends from the pylorus to the left on the pyloric end of the stomach to that extent.* As I draw the stomach into view I find that the carcinoma extends along the lesser curvature as a broad mass, sickle-shaped up as far as the esophageal opening. As I examine the greater curvature I find the tumor also involves the greater curvature of the stomach. Dividing the peritoneum between the stomach and transverse colon in order to see the posterior surface of the stomach I find that the posterior surface of the stomach is so extensively involved that we could not use the posterior surface in doing a gastro-enterostomy. Pulling the entire stomach as far out of the external wound as I can without too great tension I find that the only part of the stomach which is at all normal is the anterior surface to the right of the carcinoma the normal portion beginning about 4 inches from the pylorus. *This we can safely use in doing a gastro-enterostomy*

Inasmuch as we cannot do a posterior gastro-enterostomy

we will do our old fashioned original anterior gastro enterostomy which is under certain circumstances a very serviceable operation. It must however be correctly done. The loop of jejunum must be a long loop and not a short one. I usually use a portion of the jejunum about 15 inches from the jejuno duodenal junction in making this anastomosis. I therefore measure off about 15 inches of the intestine and find that at that point the mesentery of the jejunum is long enough to permit me to bring it in contact with the anterior surface of the stomach without tension. I now clamp the free normal portion of the anterior stomach wall with intestinal clamps and this loop of the jejunum in the same way and make an anastomosis with three rows of sutures. I would like to call your attention to the fact that the jejunum as I first picked it up was very much contracted and in a spastic condition and not much wider than my index finger. Just as soon as I completed this operation and the gas and stomach contents could pass from the stomach into the jejunum this portion of the jejunum at once dilated until it is now four or five times the size that it was before we made the anastomosis showing that it begins to functionate immediately after we remove the clamps.

It is hardly necessary for me to emphasize the fact that this is purely a palliative operation. There is only one condition in which an operation of this kind proves to be curative and we have experienced that exception in several cases that is where the tumor which we regarded as carcinoma is not carcinoma at all but a massive ulcer and in cases of that kind what is undertaken as a purely palliative operation proves in fact to be curative. We have several times had this experience. I have no doubt of the correctness of the diagnosis of carcinoma here but in some cases where we were certain that the mass at the pylorus was carcinoma and not an edematous mass produced by a large ulcer we have given an unfavorable prognosis and then we have been surprised a year or two years later to find that the patient was not only living and well but had recovered completely from the condition and that there had been a complete disappearance of the growth proving that our clinical

decide whether it is wise to resect do a palliative operation, or make the operation purely exploratory and close without doing anything further

The patient is now etherized and I want to call your attention to the incision we shall make here. Beginning in the angle between the ensiform cartilage and the left costal arch and a little to the left of the median line, we carry our incision down a little to the left of the median line to just above the level of the umbilicus. We go to the left of the median line in order to avoid the round ligament of the liver. Dividing the skin and superficial fascia and the anterior sheath of the rectus, the posterior sheath of the rectus and the peritoneum we now open freely into the peritoneal cavity. The left lobe of the liver first comes into view at the upper angle of our incision, and then the stomach. As I draw the stomach out you see that we have to deal with a very large carcinoma, much larger than I imagined from physical examination of the patient or from the x-ray pictures. This carcinoma begins at the pylorus and does not involve the duodenum, it is about $2\frac{1}{2}$ to 3 inches in diameter. The main mass is about 3 inches in length, that is it extends from the pylorus to the left on the pyloric end of the stomach to that extent. As I draw the stomach into view I find that the carcinoma extends along the lesser curvature as a broad mass, sickle-shaped up as far as the esophageal opening. As I examine the greater curvature I find the tumor also involves the greater curvature of the stomach. Dividing the peritoneum between the stomach and transverse colon in order to see the posterior surface of the stomach I find that the posterior surface of the stomach is so extensively involved that we could not use the posterior surface in doing a gastro-enterotomy. Pulling the entire stomach as far out of the external wound as I can without too great tension I find that the only part of the stomach which is at all normal is the anterior surface to the right of the carcinoma the normal portion beginning about 4 inches from the pylorus. This we can safely use in doing a gastro-enterostomy

Inasmuch as we cannot do a posterior gastro-enterostomy

cases that have been described in the literature as leather bottle stomachs. These leather bottle stomachs occur in two pathologic conditions—one carcinoma the other syphilis. I do not mean to say that this is an example of a pure type of leather bottle stomach but the extent of the invasion especially on the posterior surface reminds one very much of that type of lesion. I think however the term should be limited to cases in which we have not a distinct tumor to deal with but in which there is wide invasion of a large portion of the stomach wall and general thickening of the wall so that it reminds one of a leather bottle made out of very thick material. We have had a number of these cases to deal with. Sometimes the lesion involves the entire stomach so that a gastroenterostomy cannot be considered and the only thing that can be done is a complete extirpation and this of course should not be done if there is any glandular involvement that cannot be removed or any evidence of secondary carcinoma. The great majority of these leather bottle stomachs are carcinoma. Occasionally they are undoubtedly specific. There is a third group of cases in which we find a positive Wassermann suggestive therefore of a syphilitic pathology of the stomach lesion in which however a very careful microscopic examination shows that the lesion is carcinoma occurring in a syphilitic individual.

diagnosis was wrong and that the patient had not a carcinoma but an ulcer

I am not overenthusiastic about these palliative operations in cancer of the stomach and yet they are clearly indicated in cases of this kind even in cancer. Many of these patients have gained 20 or 30 pounds in weight and are given palliation for six months or a year or even longer by gastro-enterostomy

The external incision is closed completely without drainage. The after management is simply that for the first twenty four hours the patient will be given 8 or 10 ounces of normal salt solution every three or four hours per rectum. At the end of twenty four hours we begin with 1 ounce of water by mouth every hour and if it is borne without vomiting in twelve hours milk and cream and broth are given in small amounts. If vomiting (after the legitimate anesthetic vomiting) persists we do not hesitate to wash out the stomach relying on the integrity of our suturing and we do this even inside the first twenty four hours in many cases. There is one thing that we have learned in handling these gastro-enterostomies that is the desirability of stimulating stomach peristalsis so that the stomach can empty itself. In order to encourage this in addition to washing out the stomach we have found several other means of value first the use of a little bicarbonate of soda and calcined magnesia 10 grains each every hour and in some cases I have found a very small amount, $\frac{1}{2}$ or 1 dram of castor oil given every hour or two has been of value in preventing the development of gastric ileus and the development of what a number of years ago we saw very frequently namely vicious circle and vicious circle occurred. I am quite sure in the old time anterior gastro-enterostomy more frequently than it does now by the posterior method. I would not be dogmatic in my statements in regard to the value of these mild stimulants to peristalsis such as calcined magnesia and castor oil and yet our experience in quite a number of cases seems to show that they have been of value. I do not think they should be overdone and frequently it is necessary to assist them by washing out the stomach every six or eight hours.

The extensive invasion of this stomach reminds one of the

cases that have been described in the literature as 'leather bottle' stomachs. These 'leather bottle' stomachs occur in two pathologic conditions—one carcinoma, the other syphilis. I do not mean to say that this is an example of a pure type of "leather bottle" stomach but the extent of the invasion, especially on the posterior surface, reminds one very much of that type of lesion. I think, however, the term should be limited to cases in which we have not a distinct tumor to deal with but in which there is wide invasion of a large portion of the stomach wall and general thickening of the wall so that it reminds one of a "leather bottle" made out of very thick material. We have had a number of these cases to deal with. Sometimes the lesion involves the entire stomach so that a gastroenterostomy cannot be considered and the only thing that can be done is a complete extirpation and this, of course, should not be done if there is any glandular involvement that cannot be removed or any evidence of secondary carcinoma. The great majority of these 'leather bottle' stomachs are carcinoma. Occasionally they are undoubtedly specific. There is a third group of cases in which we find a positive Wassermann suggestive, therefore, of a syphilitic pathology of the stomach lesion, in which however, a very careful microscopic examination shows that the lesion is carcinoma occurring in a syphilitic individual.

CARCINOMA OF THE SPLENIC FLEXURE

Summary Technic of abdominal exploration—discovery of carcinoma of splenic flexure in present case. Treatment—the Mikulicz operation

This patient a man of fifty has been referred to me by Dr. B. W. Sippy. The case has been under observation for a number of weeks and has been studied with unusual care. The records in the case are quite voluminous and I shall simply give you a sketch of the important facts. The man complains of loss of weight and strength, diarrhea and blood in his stools. There has been no evidence of intestinal obstruction and after making an exhaustive research the internists have been able to eliminate the stomach and duodenum as a source of hemorrhage or of any trouble and are able to exclude the rectum and sigmoid as a source of hemorrhage. We are therefore able to say with some degree of assurance that the lesion is either fairly high up in the large intestine or in the small intestine. The blood in the stools is mixed and is found in the center of the stools and not on the outside of the stools as we might expect it if the hemorrhage were from the rectum or from the sigmoid. A careful analysis of the stomach and duodenum fails to show anything abnormal. A careful physical examination of the abdomen fails to reveal any palpable masses. The patient has been fluoroscoped and the stomach and small intestine examined in this way and also the large bowel and no filling defect has been found. The clinical diagnosis therefore is that of a lesion of either the small intestine or the upper part of the large intestine which has produced bleeding and diarrhea but no evidence of obstruction and has resulted in the loss of at least 50 pounds in weight in the last six months. One thinks of several possibilities such as tuberculosis, carcinoma and multiple polypi. I have gone over the records carefully and agree with the internists in their conclusion. It is therefore a case in which we must resort to an exploratory for the final diagnosis and even this may not prove determinative.

Under ether anesthesia I am making as you see a midline laparotomy incision one beginning in the midline about 3 inches above the umbilicus and extending around and about 3 inches below the umbilicus. This will enable me to make a very complete survey of the entire abdominal contents. Opening the peritoneum I find a quite free peritoneum. The liver comes into view at the upper angle of the incision. I inspect the gall bladder which is normal. I then inspect the stomach and duodenum and find no evidence of either carcinoma or ulcer. I now pick up the colon and rather to my surprise I find in the transverse colon and in the ascending colon at the cecum a semisolid mass of fecal matter. This is an unusual finding and points to the possibility of some obstruction distal to this point. Running my hand along the transverse colon to the left side at the upper part of the splenic flexure I find a massive carcinoma of the *splenic flexure*. I can trace the *transverse colon* into it and I can trace the descending colon leading down from it. It is two-thirds the size of my first and you will be surprised at the size of this mass because I stated to you that there was no palpable tumor found. The explanation is that the mass is entirely covered by the ribs so that it would be impossible to palpate it.

I am not sure whether this is a case in which we can do a radical operation or not. I am somewhat undecided as to whether we shall attempt a radical operation or be satisfied with an anastomosis which will side-track this growth and relieve the patient temporarily of his distress. Of course if it were possible to excise this mass it would be very desirable and I think we would be justified in submitting the patient to a good deal of risk in our effort to accomplish this rather than to be satisfied with a purely palliative operation.

I extend the incision upward to the ensiform in order to give me plenty of room to attempt to remove this splenic flexure carcinoma. I find that the mass is attached to the spleen and as I draw the mass down I draw the spleen into view and there is a fairly broad adhesion about $\frac{3}{4}$ inch in width and $\frac{1}{2}$ inch in thickness extending from the splenic flexure up to the bottom of the spleen. I clamp this between two artery forceps and divide

between The first thing that must be accomplished in this case is the mobilization of this portion of the colon so that we can bring the involved colon freely into view and out of the external incision In order to accomplish this it will be necessary for me to divide the outer avascular layer of the descending mesocolon and separate the transverse colon from the stomach (Fig 107) The upper portion of the descending mesocolon is edematous and thickened, and I am afraid that this thicken



Fig 107 —Diagram showing location of tumor and site of incision through transverse mesocolon and peritoneum lateral to descending colon for mobilization of splenic flexure

ing means carcinoma although it may be simply an edematous inflammatory thickening I now divide the outer layer of the mesocolon so that we bring the mass fairly well into view (Fig 108) I find that it is an adhesion to the pancreas and to the first piece of the jejunum I can however with the gloved finger and without very much force separate the adhesion to the pancreas by blunt dissection as I continue this downward I find that I have injured the first portion of the jejunum For

tunately, I recognize this at once and close the opening in the gut with three layers of sutures using Pagenstecher's linen. The



Fig. 108.—Diagram showing mobilization of splenic flexure completed.

raw surface from which I have dug out this huge carcinoma bleeds slightly and I pack it with a dry abdominal pad. There

are no vessels of any size which require ligating or suturing. I believe the safest plan will be to handle this by what is known as the Mikulicz method.

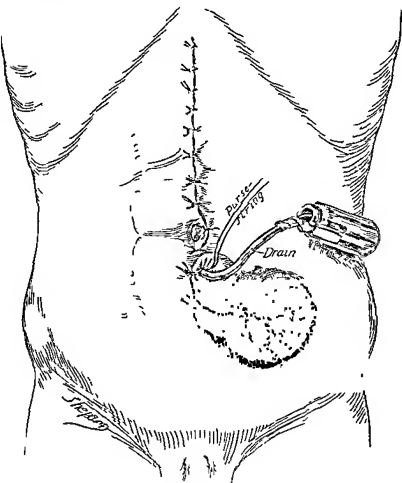


Fig 109—Tumor bearing splenic flexure brought out of abdomen, and incision closed. Note catheter in proximal loop as safety-valve.

I shall bring the mass out of the abdomen and leave it out of the abdomen, without removing it at present, and close the

upper three-fourths of the abdominal wound, leaving the lower portion just below the umbilicus open to an extent sufficient to

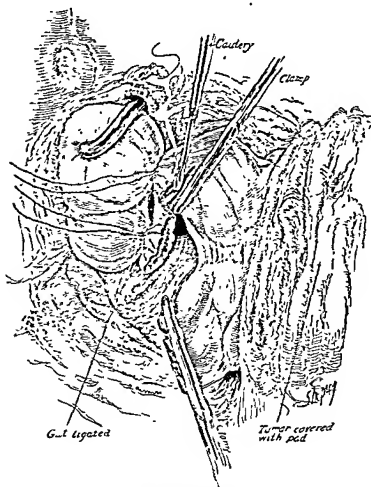


Fig 110 — Removal of tumor-bearing tissue three days after primary operation.

accommodate the double loop of colon that we shall leave outside. In order to relieve any intra-intestinal tension and at the same time provide opportunity for us to introduce enough fluids

into the patient I shall sew into the proximal cecum that is the transverse colon side a No 14 American catheter (Fig 109) I do this with a couple of purse-string sutures so as to make this perfectly water tight In the raw surface from which we removed this growth and which we have packed with a dry abdominal pad I introduce some iodoform gauze after removing this abdominal pad I dislike very much to leave this iodoform gauze in position At the same time there is some oozing and I am not willing to take the chance of any hemorrhage here I think it will be well controlled with an iodoform gauze pack It is a distressing thing to use these iodoform gauze packs because removal of them is very distressing to the patient and carries some risk and I never use them unless their use is the least objectionable horn to a dilemma such as confronts us here

If the patient recovers from the immediate effects of the operation we shall at the end of three or four days ligate both arms of this colon loop close to the abdominal wall with heavy silk ligatures cut the bowel distal to the ligature with an electric cautery and remove the mass (Fig 110) This will give us a double-barrel colostomy opening one extending into the descending colon and one into the transverse colon coming out at the lower angle of our wound After a week or ten days the septum between these two intestines will be clamped with heavy clamps with the idea of producing by pressure necrosis a large opening between the two portions of the colon (Fig 111 *a b c*) This will permit of the free passage of fecal matter from the transverse colon into the descending colon and the external opening will close to a greater or lesser extent Sometimes these openings close completely If they do not at the end of a few weeks under local anesthesia a final operation can be made closing the fistula into the bowel (Fig 111 *d*) We do not like to resort to the Mikulicz operation I prefer very much as I have told you a number of times in these clinics a primary radical resection or a colostomy and a radical resection and final closure of the colostomy wound to a Mikulicz operation I think however that conditions do arise as in this case in which the Mikulicz operation is the preferable procedure

upper three-fourths of the abdominal wound, leaving the lower portion just below the umbilicus open to an extent sufficient to

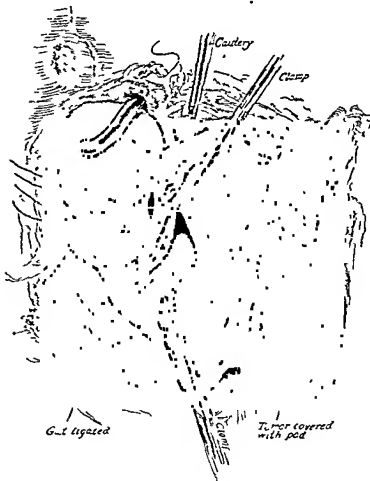


Fig 110 — Removal of tumor bearing tissue three days after primary operation

accommodate the double loop of colon that we shall leave outside. In order to relieve any intra intestinal tension and at the same time provide opportunity for us to introduce enough fluids

• The prognosis in this case I regard as extremely grave I think the patient runs a very great risk—possibly a 50 per cent risk—of dying from the operation. On the other hand if he does recover I think he will have a very good palliation from his symptoms although I do not believe there is much prospect of a radical cure.

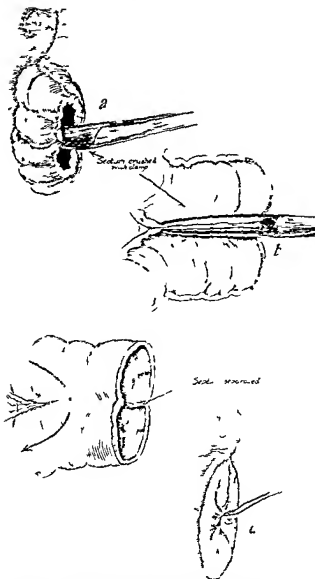


Fig 111 —Diagram illustrating method of destroying septum between afferent and efferent loops, thus restoring continuity of colon

IMPERFORATE ANUS

Summary A case of imperforate anus with communication between bladder and rectum cured by primary colostomy secondary plugging of bladder rectal fistula with bismuth paste and final suture of open end of rectal pouch into normal position in perineum Further remarks on imperforate anus

In a clinic some weeks ago I had the opportunity of discussing the subject of imperforate anus rather fully and showing you several cases Today we have a case of imperforate anus which we have had under observation for some time which presents a number of interesting features

This boy is now five years of age He was brought to me a day or two after birth with an imperforate anus and with the statement that meconium was being expelled from the urethra with the urine I did at once a left sided colostomy to save the child's life He made a very good recovery and within a few weeks was quite a fine strong child normal in every way except for the colostomy opening taking the place of the normal anus

When he was about three years of age his parents brought him back to me and I restudied the case I filled the blind pouch distal to the colostomy with barium and obtained a very excellent x ray picture which showed a large blind pouch coming down to within an inch of the sphincter I planned making an essential Kraske operation at least a posterior incision removing if necessary the coccyx and bringing the blind pouch down to the sphincter opening and stitching the mucous membrane to the skin While the child was under the anesthetic however in straining he forced a lot of barium out through the urethra as a solid mass just as one might force vaselin out of a vaselin tube As I watched this I decided to postpone the operation as I came to the conclusion that the communication between the bladder and the rectum was apparently of such extent that



narrow tract leading from the blind pouch into the urethra and this has been blocked up and possibly closed entirely by the use of the barium that was injected into the blind pouch two years ago. One can say this with a fair degree of certainty because in spite of the fact that the barium is now being discharged from the distal end of the colostomy opening and there is a large mass of barium in the blind pouch none has been discharged from the urethra and the urine is quite normal. These facts have encouraged me to undertake a radical operation in this case.

Under anesthesia the child is now placed on its face and abdomen and the operating table is broken so as to bring the posterior surface of the pelvis sacrum and coccyx high up in the air in the same position that we do our Kraske operation for carcinoma of the rectum. The field of operation has been prepared and I now make a posterior incision extending from the lower end of the sacrum down almost to the external sphincter (Fig 112 a). I call your attention to the fact that although there is no opening at the external sphincter there is evidently very good development of the muscles in this region as you can see by the movements of the perineum when the child cries. The incision is about $3\frac{1}{2}$ inches in length and as I divide through the soft tissues so that I can expose the rectum behind and separate the levator ani muscles I come down to a layer of fat and as I separate this fat I come down to the blind end of the rectum and I can see the white barium shining through this pouch and can distinctly feel a hard mass of barium inside of this closed rectal pouch. I now carefully dissect out this rectal pouch so that I can bring it well down into the wound and so that I can demonstrate to myself that if I open it I can stitch it into the sphincter without tension (Fig 112 b).

The next step of the operation is to take a fine tenotome and examining very carefully the position of the external sphincter I make a small opening through the skin and center of the external sphincter with the tenotome. I then introduce into this opening a grooved director and alongside the grooved director a closed pair of artery forceps. I now stretch the small opening

it was probable that the bladder and rectum formed one cloaca, and that it would be difficult or impossible to do an operation that would enable us to separate these two viscera and obtain a good functional result, and that is the conclusion that I have arrived at from my study of these cases that where the bladder and rectum form a large single cavity or are connected by a very large opening it is difficult to plan any surgical procedure that will enable us to separate the viscera. I therefore at that time gave up the operation and allowed the child to come out from the anesthetic, and told the parents that I felt it was unwise to undertake the operation that I had planned. I asked them to bring the child back from time to time so that I could keep him under observation.

The child has grown up into an unusually bright and intelligent boy and was brought back to the hospital a few days ago. Since that time I have been restudying the case and we have a good deal of additional interesting light. In the first place since the boy was brought back to the hospital I had an x ray picture taken and very much to my surprise I found that the mass of barium that we had introduced two years before was still in the blind distal pouch and that it seemed to present exactly the same picture that it did when it was first introduced. The parents made this statement that during the last week there had been a peculiar chalky fluid forced out from the distal end of the colostomy opening not a large amount, but so that it could be distinctly seen on the dressings and that this had not happened until a few days before he was brought to the hospital. As I studied this x ray plate I found another interesting thing that there was a thin very narrow line of barium extending from the main mass apparently forward as though it passed through the narrow canal extending from the blind pouch to the urethra probably at the prostate or a little in front of the prostate. The urine of the child seems to be quite normal.

Examination of the evidence now at hand shows that we were mistaken in our first impressions that the bladder and blind pouch do not form a single cavity and that the communication between the blind pouch and the urinary tract is through a

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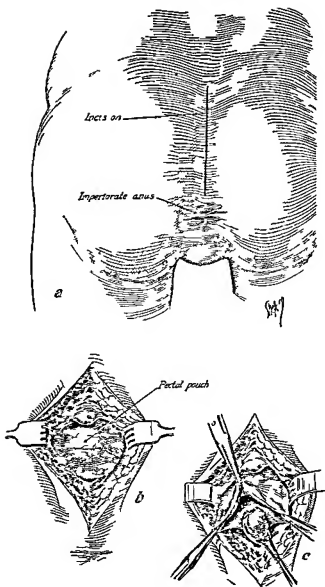
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with the artery forceps so as to make a good sized opening (Fig 113 a b) In doing this of course I separate the fibers of the external sphincter without doing them any injury I now pack off my blind pouch from the operative field and open it making an incision about $\frac{3}{4}$ inch on the apex of this pouch and introducing a scoop I now remove the barium It is rather hard and firm like a mass of putty but with little effort we can remove it I find that in doing this a spoon shaped periosteotome enables me to remove the barium more rapidly than any other instrument that I have on my instrument tray (Fig 112, c) Wiping the open rectum with sponges I introduce four rather small artery forceps through the opening which I have made at the sphincter pass them up and grasp the opening that I have made in the rectum at four points and then gently draw the rectum down so that the mucous membrane comes to the skin at the external sphincter (Fig 113 c) I now unite the skin and mucous membrane of the rectum with eight fine black silk sutures I am in this suturing uniting the skin to all the walls of the rectum passing my needle not only through the mucous membrane but also through the muscularis (Fig 113 d) I introduce into the distal and upper part of the wound just below the coccyx a small strip of iodoform gauze and close this distal wound with silk sutures In order to protect this line of suture from urine I shall dress it with zinc oxid paste I have found in children in operations such as this and in spina bifida operations that a dressing with sterile zinc oxid paste has given me more protection against infection from fecal and urinary discharges than any other method of treatment that we have employed

After-history—I am glad to say that this little patient made an excellent recovery the mucous membrane of the rectum and the skin uniting in a very satisfactory way the distal incision closing rapidly and healing completely within two weeks The iodoform gauze was removed on the second day Some barium was discharged through the external sphincter No fecal mat

Fig 112—Through a long incision (a) the rectal pouch filled with barium two years previously is exposed (b) the pouch opened and the barium removed (c)



F g 112

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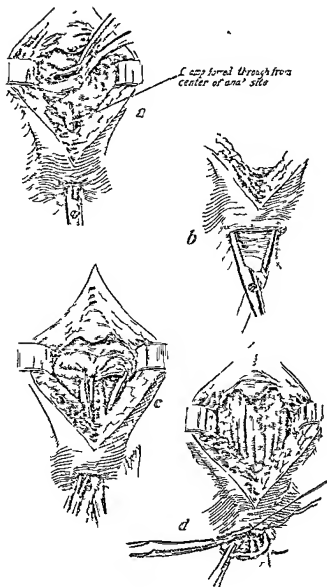


Fig 113

ter has passed through the new route because of the sharp bridge that still exists in the colostomy opening. I shall not do the last stage of the operation for six or eight weeks, until the boy recovers entirely from any evidence of his last operation. The final operation will, of course, be the closure of the colostomy opening, which in this boy's case we shall do under general anesthesia. In adults we have been as a rule, doing this third stage of an operation of this type under local anesthesia. It is essential to have the co operation of the patient in doing such an operation under local, and this of course we could not very well obtain in a boy five years of age. It is necessary in order to keep the new opening from contracting to keep a rubber tube in the new rectum. I have taught the mother how to clean and reintroduce this when it comes out.

This case has been very instructive to me. It forms the exception to the rule which we have formulated on the basis of our experience in this clinic with similar cases that is that it is usually wise in these cases of imperforate anus where there is a connection between the lower end of the rectum and the bladder to be satisfied with a permanent colostomy opening and not to risk the life of the little patient in an attempt to separate the rectum and the bladder. This case demonstrates very beautifully that in some cases at least conditions warrant the attempt to separate the bladder from the rectum and obtain practically normal conditions.

One particularly interesting fact is met with in this case, that is that we have been able to cure apparently with what amounts to bismuth paste the fistula that exists between the blind pouch and the urethra. To be sure fortunately this was a very narrow fistula and so small that in our operation to bring the rectum down to the sphincter we have not encountered it at

Fig. 113.—An artery forming

all. Therefore, it must have been of very small size, and yet we know from positive evidence that this fistula did exist, and that under pressure before we made the colo-tomy meconium was forced out of the bladder; and that after we had introduced the barium into the distal pouch this barium was forced out through the urethra under the anesthetic. These pieces of evidence are definite and absolute.

FRACTURE OF THE MALAR BONE

Summary Marked deformity following recent fracture of the malar bone
Demonstration of a simple method of reduction and fixation

THE second case I shall show you this morning is that of a medical colleague of mine who comes from an adjoining city and who recently met with an accident in cranking his automobile. The accident happened two days ago. He believes that the exact injury occurred in this way: when he was cranking the automobile it back-fired and he was thrown violently against the fender, his face striking the fender. He does not think that the handle of the crank struck his face. At any rate, he comes to us with the malar bone on the left side of his face driven in to the extent of about $\frac{3}{4}$ inch, showing as you see a very marked depression and a very great deformity. Fortunately, the eye was not injured, although there is very extensive contusion and some hemorrhage under the conjunctiva. There is no injury to the eye itself or to the muscles of the eye. The injury consists apparently entirely of a complete fracture of the malar bone, the breaking off of the malar at its junction with the superior maxilla and at its junction with the frontal bone and at its junction with the zygoma. There seems to be no injury to the facial nerve in any way, but there is a very marked injury of the second division of the fifth nerve, as all the area of distribution of the second division of the fifth pair of nerves is paralyzed. I hope and believe that it is due simply to the contusion and that it will be temporary and that there will be a restoration of function and sensation.

We have had this problem presented to us several times and in some cases we have hesitated to do an open operation and elevate the depressed bone where the depression was slight, feeling that the scar resulting would be more of a deformity than the slight depression. In this case the depression is so marked that it becomes necessary to correct the deformity by elevating the bone. A number of surgeons have studied this problem and have solved it in different ways. A recent article described the handling of one of these cases by grasping the

bone with a pair of cow horn forceps such as dentists use grasping the bone with the points of these forceps and pulling it out into position. I have looked over our dental instruments and find it would be very difficult to employ a cow horn forceps in this particular case. As I have studied the gross anatomy of the lesion on the skull it seems to me that we can solve the problem in a much easier way and elevate the bone without

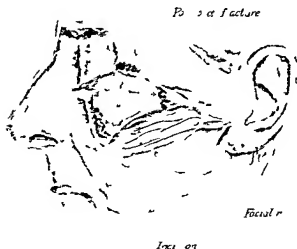


Fig 114 —Diagram illustrating character of lesion in present case and incision through which instruments may be passed for correction of the deformity

any scar or without any resulting deformity. I shall ask you to follow closely the plan which I shall carry out in this case.

We shall anesthetize the patient with gas. The face has been quite carefully sterilized. I now take a fine tenotome and make a little incision at the lower border of the malar bone an incision probably $\frac{1}{2}$ inch in length. I make this parallel with the course of the branches of the facial nerve in this region so

as to do little or no injury to any of these branches. This tenotome incision passes up to the posterior surface of the malar

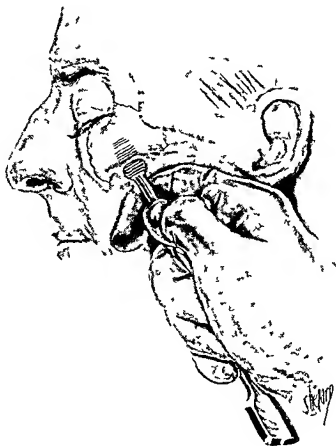


Fig. 115.—Fragment forced into position by means of stout periosteal elevator passed beneath bone through tenotomy incision.

bone. I now take this stiff narrow periosteal elevator and introduce it in this small incision made by the tenotome and without

any difficulty elevate first the portion of the malar bone which has been broken off from the superior maxilla and bring that accurately up in position. I now elevate that portion which unites with the malar process of the frontal and as I do this I find that I elevate the bone quite perfectly into position and that the last manipulation has brought the zygomatic process of the malar in accurate approximation to the zygomatic process of the temporal. I examine it now carefully before I allow the patient to come out from the gas and I find we have apparently secured perfect reduction. The edges of the fracture are apparently so rough that there is now little likelihood of the bone assuming its former malposition. I test this out very carefully by grasping the bone in my fingers and find that simply to move it without my periosteotome is impossible. If I found that there was any tendency to recurrence of the displacement and I have prepared myself for this contingency by having the head surgical nurse sterilize these large stiff broad needles I shall pass one beneath the malar bone through the skin so as to maintain the position and prevent any displacement. I do not believe however that this is necessary in this case so we shall simply dress the wound with a small piece of iodoform gauze over the tenotome incision and then over this place a couple of layers of adhesive plaster covering that side of the cheek and giving I think some support to the bone and eliminating the chance of recurrence of the displacement.

After history —The patient was allowed to leave the hospital on the third day. The single suture that had been used to close the tenotomy incision was removed at that time. The patient was very much delighted with the result of the operation and with the disappearance of the deformity.

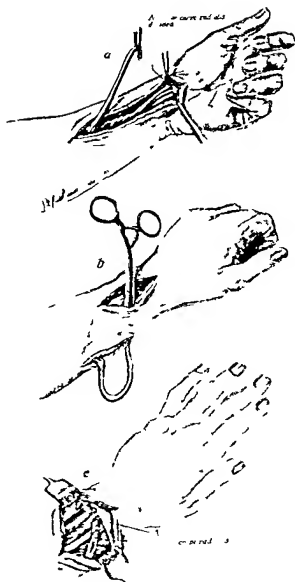
I would like to submit this method as being entirely satisfactory in cases of this kind in fact in any depressed fracture of the bones of the face. The two fundamental principles involved are elevation through small tenotomy incisions which leave little or no scar and the maintenance of the correct position in other words preventing recurrence of the deformity by the use of needles so placed as to prevent any depression of the fragments.

MUSCULOSPIRAL PARALYSIS TREATMENT BY TENDON TRANSPLANTATION AND NERVE SUTURE

Summary Extensive loss of tissue due to gunshot wound of the arm with complete paralysis of extensors of the wrist. Technic of transplantation of tendon of M. flexor carpi radialis to extensor tendons. Fundamentals of nerve suture—great value of actual end to end anastomosis. Prognosis.

THIS young man was injured eleven years ago. He was holding a shotgun in his hand and the muzzle of the gun was held in such a way that it was within a few inches of the elbow so that when the gun went off it blew a hole through the arm just above the elbow. The gun was loaded with twelve buckshot and it was so close to the arm that the charge went through it like a solid bullet. There was evidently a very extensive compound fracture of the humerus 3 or 4 inches above the elbow joint with great tearing away of the soft tissues including the musculospiral nerve. There has been no effort made to repair the nerve or to improve the function of the arm by tendon transplantation. There is good union of the humerus but complete paralysis of the muscles supplied by the musculospiral below the point of injury. The patient is an unusually muscular man and has kept himself in excellent general physical condition in spite of the injury to the arm the muscles of the other arm being unusually well developed and the muscles of the injured extremity above the point of injury also stand out as great muscular masses.

I have studied the case with a good deal of care and have decided to do two things to transplant the flexor carpi radialis and make of it an extensor of the hand and of the fingers following a plan which I saw first practised by Murphy five or six years ago. I shall also make a direct suture of the musculospiral nerve. I want to call your attention to one interesting fact that when he flexes the forearm at right angles to the arm it brings the scars of the wounds of entrance and exit almost opposite each other showing that when we suture the musculo



F. 115

spiral nerve we will have little difficulty in bringing the ends together provided we place the forearm in semiflexion. I have more confidence in obtaining improved function by the transplantation of the tendon than I have from the suturing of the nerve and I shall therefore do the tendon operation first.

The patient is now etherized and I dissect out the insertion of the flexor carpi radialis tendon (Fig 116 *a*) as far down on the wrist as I can. I extend my dissection up the forearm for about 5 or 6 inches freeing the extensor tendon very fully for that distance. Turning the hand over I now expose the extensor tendons of the wrist and fingers just above the posterior annular ligament. Taking a pair of curved artery forceps closed I burrow a tunnel in the superficial fat from the posterior incision to the incision on the anterior and outer surface of the forearm. Picking up the end of the flexor carpi radialis tendon in the artery forceps I pull the tendon through this fat and connective tissue tunnel (Fig 116 *b*). I then split the extensors of the first and second phalanges of the thumb the extensor of the index finger and the common extensors of the fingers so that I can pass the flexor carpi radialis tendon through each one of these tendons and sew the flexor tendon with fine catgut suture in these extensor tendons (Fig 116 *c*). I now close both wounds without drainage.

The next step of the operation will be the suturing of the musculospiral nerve. Flexing the forearm at right angles to the arm so as to bring the scars of entrance and exit close together I dissect out the scar tissue and I find at once without difficulty the bulbous proximal end of the nerve. You will notice the nerve has a bulb on it about half the size of a cranberry. The distal end is found with a little more difficulty but I now see the small distal end of the nerve coming into view in the dissection. It is separated from the proximal end by about $\frac{1}{2}$ inch of dense scar tissue which is adherent to the humerus. You will notice that

Fig 116—The tendon of the flexor carpi radialis is cut at its insert on *dissected from its bed (a)* and drawn to the dorsum of the arm through a subcutaneous channel (*b*) to be passed through and sutured to the tendons of the paralyzed extensor ()

the distal end of the nerve is curled down upon itself in the scar. Let me call your attention to the fact that in this dissection I am particularly careful not to pull the nerves with the dissecting forceps and that I am dissecting the nerves out of the scar tissue here with the greatest care so as not to bruise or contuse them in any way. All my cutting is in the scar outside the nerves and my handling of the tissues is limited entirely to the scar tissue. I cannot too strongly emphasize the importance of this fact because undoubtedly in some of the old operations for nerve suture surgeons did a good deal of damage to the nerve for some distance because the nerve was pinched and grasped by tissue forceps and dissected out of the scar in that way. The modern method and the rational method is to very carefully leave the nerve alone and with a very sharp knife cut through the scar tissue about it so as to free it but without doing it any injury.

Making a little tension on the proximal end and slight tension on the distal end I can now overlap the two portions of the nerve so that I find that I can readily excise the bulbous proximal end, cut off the ragged distal end squarely and yet have enough room to bring the nerve ends together and suture them without tension. As I dissect out the bulbous end however I am leaving a rather broad portion of the sheath of the bulb posteriorly and using this as a means by which I can place two tension sutures through this sheath and through the sheath of the distal end of the nerve. I am using very fine catgut for suture and I have used altogether five catgut stitches in making a very good end-to-end approximation of the nerve (Fig. 117).

I am afraid that this operation has been very tedious and yet it would be difficult to shorten it very much. You will notice we have been about an hour and a half in doing the tendon transplantation and the nerve suture and in applying the dressing. The arm is dressed in a large aseptic dressing and put up at right angles in a light plaster-of-Paris splint. I shall encourage the patient to attempt to move the fingers two or three days after the operation. It has been found in these tendon transplantations that early function is very desirable and does much to ensure a good result.

After-history.—Fortunately, the patient made an excellent operative recovery, the wounds healing by primary intention *without reaction*. I instructed him on the third or fourth day to attempt to extend the hand and fingers, and he was very much delighted to find that he could do this. I have encouraged him

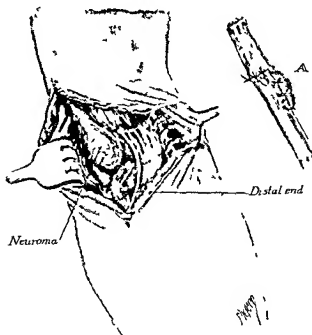


Fig. 117—Nerve ends exposed. The dotted lines indicate the lines of incision for removal of cicatrix from the exposed ends. A End-to-end anastomosis and utilization of portion of cicatrix to reinforce suture line.

to continue active movements and passive movements of both hand and forearm and at the end of a month he has very good extension of his hand and fingers, due, of course, not to the regeneration of the nerve but to the tendon trans-plantation. I have informed him that at the very best it would take a year

the distal end of the nerve is curled down upon itself in the scar. Let me call your attention to the fact that in this dissection I am particularly careful not to pull the nerves with the dissecting forceps and that I am dissecting the nerves out of the scar tissue here with the greatest care so as not to bruise or contuse them in any way. All my cutting is in the scar outside the nerves and my handling of the tissues is limited entirely to the scar tissue. I cannot too strongly emphasize the importance of this fact because undoubtedly in some of the old operations for nerve suture surgeons did a good deal of damage to the nerve for some distance because the nerve was pinched and grasped by tissue forceps and dissected out of the scar in that way. The modern method and the rational method is to very carefully leave the nerve alone and with a very sharp knife cut through the scar tissue about it so as to free it but without doing it any injury.

Making a little tension on the proximal end and slight tension on the distal end I can now overlap the two portions of the nerve so that I find that I can readily excise the bulbous proximal end, cut off the ragged distal end squarely and yet have enough room to bring the nerve ends together and suture them without tension. As I dissect out the bulbous end however I am leaving a rather broad portion of the sheath of the bulb posteriorly and using this as a means by which I can place two tension sutures through this sheath and through the sheath of the distal end of the nerve. I am using very fine catgut for suture and I have used altogether five catgut stitches in making a very good end-to-end approximation of the nerve (Fig. 117).

I am afraid that this operation has been very tedious and yet it would be difficult to shorten it very much. You will notice we have been about an hour and a half in doing the tendon transplantation and the nerve suture and in applying the dressings. The arm is dressed in a large aseptic dressing and put up at right angles in a light plaster of Paris splint. I shall encourage the patient to attempt to move the fingers two or three days after the operation. It has been found in these tendon transplantations that early function is very desirable and does much to ensure a good result.

CLINIC OF DR. GOLDER L. McWHORTER

PRESBYTERIAN HOSPITAL

PERINEAL ECTOPIA TESTIS

Summary Perineal testicle with a small inguinal hernia in a twenty one year old patient orchidopexy bilateral herniotomy

THIS patient I F W twenty one years of age complains of a double inguinal hernia and a mass in the perineum which pains him on pressure

The patient has always had a small hernia on the left side. The one on the right side was first noticed after a fall on the side walk at the age of seven years. The right testicle is in the scrotum but the left side of the scrotum is empty. The mass in the perineum which has been present since birth gives testicular sensation on pressure. It is evidently the left testicle. The patient has played basketball and wrestled but says that on wrestling the perineal testicle often got caught between his thighs and pained him. He states also that his trousers often press against it causing much discomfort.

There are three brothers one paralyzed on the right side and one with an inguinal hernia. There are two sisters one of whom was recently operated on by me for bilateral indirect inguinal hernia. The father has a double inguinal hernia.

On physical examination the general condition is excellent. The patient is of stocky build and well developed. There is a fairly large hernia extending into the right side of the scrotum and reducible with some difficulty. On the left side there is an impulse in the inguinal region on coughing and a small hernia palpable in the inguinal canal. The scrotum is empty on the left side but apparently well developed although somewhat smaller than the right side. A mass the size of the right testicle

for regeneration of the musculo-spiral to occur and that there is simply a fair prospect of this occurring

The old statistics of these secondary sutures seem to give 30 to 40 per cent of successful results. It is too early as yet to state with any certainty the statistics of the enormous number of cases of nerve suture that occurred during the war but the general impression is that the results are somewhat more satisfactory than those furnished by the older statistics

It seems to me that what we have done here is thoroughly sound and rational and that we should in similar cases of musculo-spiral injury do the combined operation of tendon transplantation and nerve suture the tendon transplantation of course offering the prospect of almost immediate improvement and being I believe of value in maintaining the hand and fingers in the best possible position and maintaining the function of the joints so that if regeneration does occur we will find the muscles of the limb generally in condition where the recovery of the nerve supply will enable the patient much more rapidly to obtain motor control

I would like to say one last word in regard to the operations for nerve suture in general and that is this. From the large experience that was afforded to the war surgeons generally we seem to be coming to the conclusion that the one operation that offers hope or any considerable hope of nerve regeneration is direct nerve suture that the various operations such as transplantation of free nerve tissue or providing tubes of fascia or of other substances through which the nerve fibers might regenerate for long distances offer but very slight hope of benefit. It becomes our duty therefore to make every possible effort by free dissection by stretching the nerve within safe limits to secure greater length and by dressing the limb in such a position that we can bring the nerve ends together without tension to make a direct nerve suture. It is only in cases in which a direct nerve suture cannot be made by resorting to these various expedients that a more or less experimental nerve anastomosis nerve transplantation the use of tubes of fascia and so forth might properly be considered

On the left side I will make the same inguinal incision for the hernia repair and orchidopexy. I find on dissecting down upon the hernia that there is a small indirect sac which has at its

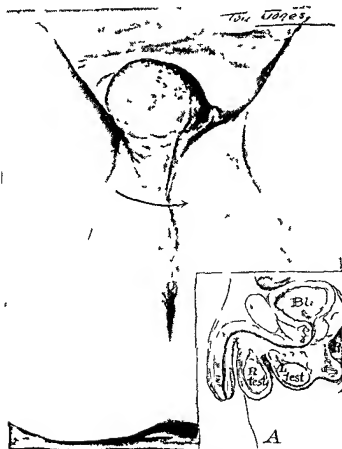


Fig 119 —Perineal ectopic testis. I A Anatomical relations of ectopic testicle in case demonstrated

termination the obliterated processus vaginalis. I am ligating the sac high up and dropping the stump back. Before repairing the inguinal canal I will remove the testicle from the perineum. I find it firmly embedded and difficult to remove on account of

can be felt in the perineum back of the scrotum and just to the left of the midline. This mass is firmly fixed in the subcutaneous tissues but its large size produces a prominence of the skin which can be readily seen (Figs 118-119). The examination is otherwise negative.

Operation—After the usual inguinal incision on the right side just above the inguinal canal I find a congenital sac extending into the scrotum and continuous with the tunica vaginalis. There



Fig 118—Before operation. The left testicle produces a bulging in the perineum behind the scrotum but is not so large as on the right. The scrotum on the left side is developed.

is a point of constriction at the internal ring. I am ligating the sac just above this point and removing it down to the region of the testicle. In this case I am removing most of the sac except the lower end which I am suturing together somewhat as in an operation for hydrocele with eversion of the sac. I now replace the testicle in the scrotum and repair the inguinal canal after the method of Bassini with the addition of the imbrication of the external oblique fascia.

naclum testis Second the testis may be pushed into its ab normal position by a hernia The latter cause may be elimi nated in this case as the hernia on the side of the ectopia was only about the size of a walnut and did not extend outside of the inguinal canal The processus vaginalis was obliterated up to the point of the hernial sac

The gubernaculum testis is derived from a fold of peritoneum covering the wolffian body and extends in early embryonic life from the lower pole of the primitive kidney to the inguinal region Later the gubernaculum transfers its upper attachment to the lower portions of the testicle Both smooth and striped muscle fibers appear At the sixth month the gubernaculum accom panied by a process of peritoneum descends through the inguinal canal The gubernaculum finds its lower main attachment at the base of the scrotum however fibers also find attachment in Scarpa's triangle the perineum about the root of the penis and toward the anterior superior spine of the ilium The fibers which terminate in the perineum may terminate by the side of the anus blend with the external sphincter or be attached to the ischial ramus Usually the gubernaculum fibers disappear two months before birth

There are several conditions of the gubernaculum which might produce variations of normal descent

- 1 Deficiency or absence of the scrotal attachments
- 2 Deficiency in the activity of its muscle fibers
- 3 Deficiency in its upper attachments

- 4 Predominance of muscle and connective tissue fibers attached to points other than the scrotum

It is disputed whether the gubernaculum assists in the descent of the testicle by active muscle contraction cicatricial contraction or whether its role is a passive one It is true in ectopia of the testis that these abnormal positions correspond fairly closely to the lower attachments of certain fibers of the gubernaculum In some animals the testes are normally in the perineum and perineal ectopia as well as other forms of ectopia, where the position is normal in certain animals may be a rever sion to type

its large size I am inserting my finger along the cord and stretching the tissues around it. The testicle is held quite firmly due to its large size but after some manipulation with traction on the cord I am able to withdraw it. I find it is perfectly free and without any attached bands. On attempting to insert my finger into the scrotum I find that there is a heavy layer of tough fascia preventing me from making a pocket there for the testicle. It is impossible to put my finger through this fascial layer. Consequently I take hold of it with a hemostat pull it into view by inverting the scrotum force a second hemostat through the layer of fascia and spread out the opening. I now enlarge the opening with my finger and make a pocket below the fascia for the testicle. The opening in the fascia permits the testicle to slip through with difficulty and I therefore feel certain it will not return to its perineal position. This makes suturing of the testicle to the scrotum or the insertion of a purse-string suture at the inlet unnecessary. I now repair the inguinal canal after Bassini's method as on the right side and close.

COMMENTS

The location of the testis in the perineum makes it incorrect to classify it as an undescended testis as this implies the arrest at some stage in the normal descent as in the abdomen or inguinal canal before it reaches the scrotum. This is however an illustration of an imperfectly descended testis or ectopia where the descent has deviated from normal.

There are three chief forms of ectopia. First the testicle is located near the root of the penis or subcutaneously above the inguinal canal. Second the testicle is situated in Scarpa's triangle. In this type the testicle has occasionally passed through the femoral canal beneath the inguinal ligament. Third the testicle is in the perineum. Many of the factors which may cause failure of descent of the testicle may be discarded as a cause of ectopia.

The two causes usually given for abnormal position or ectopia of the testis are. First the testis may be drawn into an abnormal position by traction of certain fibers of the gubernaculum.

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Trauma may be a third cause of ectopia. In such cases the testicle may have been at one time in its normal position in the scrotum. This is best illustrated in a case of Steinmann in which a seventeen year-old boy first noticed the testicle in the perineum after being hit by a snowball when fourteen years of age. Trauma from an ill fitting truss might also produce this type of ectopia especially in a patient with partially descended testis.

As a fourth possible cause of ectopia I wish to suggest variations in the anatomy of the superficial fascia especially the overgrowth of modified superficial fascia of the scrotum or tunica dartos. In this case I found a very thick, dense layer of fascia which stretched across the path leading into the scrotum and may have been the cause of the deflection of the testicle from its normal path of descent. This was perforated with difficulty and an opening large enough to admit the testicle made.

The scrotum is developed independently of the testicle the cord and its coverings. There are two chief layers of the scrotum—the skin and the modified superficial fascia or tunica dartos. The latter is a layer of fascia distinguished usually by the presence of numerous longitudinally disposed bundles of involuntary muscle-fiber elastic tissue and the absence of fat. This is connected with the fascia penile and fascia superficialis of the abdomen thigh and perineum. It is continued in the median plane as the septum scroti and so separates the spaces usually filled by the testicles and cord. In this case there was no remnant of gubernaculum holding the testis in the perineum, as we often see attached to the base of the scrotum. It seems logical to consider the resistant fascia of the scrotum as deviating the testicle from the scrotum in its descent. The resistance along the plane to the perineum may be less than that to the scrotum in some cases due to variations in the fascia and perhaps to the lack of development or overdevelopment of certain fibers of the gubernaculum associated with it. In the case demonstrated the testicle was embedded in the soft parts with absolutely no evidence of any fiber attached to the testis, the tunica vaginalis or the cord.

Evidently remains of the gubernaculum are present in many cases as Eccles states that usually the testicle is tethered in the perineum by a firm band of tissue. He believes this is the remains of the gubernaculum which has succeeded in drawing it into its abnormal position.

The influence of heredity has rather been disregarded lately although in the family of this patient there were three children and the father with inguinal hernias.

Perineal ectopia of the testis is a rare condition. In Eccles series of 936 instances of imperfect descent of the testicle 5 only were in the perineum. Coley states that at the Hospital for Ruptured and Crippled during eighteen years there were 737 cases of undescended testicles 15 of which were of the perineal type. In 6 of these no operation was done. Hutchinson and Ammon each reported a case where both testicles were in the perineum. Curling in 1857 gave a description of 9 cases of perineal testicles one of which was operated on with an unfortunate result. Monod and Terrieton in 1889 collected 30 cases. Klein collected cases up to about 1908 and reported cases of perineal testes bringing the number up to 81 cases. Coley has reported a number of his cases since then and I have been able to find single case reports by McWilliams and Mulligan. I have been unable to get access to a case report by Simpson or to a small book written by Guegin on perineal ectopia.

Hernia accompanying a perineal testis is stated by Eccles to be seldom seen although it accompanies more than one-half of all cases of imperfect descent of the testicle.

In this case while a hernia was present it was very small and could have had no influence in pushing the testicle into the perineum. However on the opposite side where the testicle was normally placed there was a congenital hernia present with abdominal contents extending down into the scrotum. This illustrates the associated lack of development of the adnexa.

The size of the testicle when located in the perineum is usually normal but may be smaller than normal as in Mulligan's case where it was about one half normal size.

The physiology of the testicle is not interfered with in perineal

ectopia so frequently as in arrested descent, where only 1 out of every 24 testes is of normal size (Eccles). In this patient the size of the two testicles was apparently identical. No sign of inflammation or thickening of the tunica vaginalis were evident. The testicles were of rather large size.

Certainly the testicle when located in the perineum is more subject to trauma. In this case pain occurred on having the legs pressed together in wrestling and irritation from the trousers pressing against the testicle was of frequent occurrence.



FIG. 170. Twelve days after operation. The left testicle is in the proper position in the scrotum and flows out although there is no relaxation of the muscles in the scrotum or lowering of the side.

Post script—There was only light ecchymosis of the scrotum on the left side and two days after operation the patient stated that he had less inconvenience and pain from the testis than before operation. The wound healed by primary intention and the patient was permitted to be up on the tenth day and was discharged on the twelfth day. The testicle was then in excellent position in the scrotum. FIG. 170.

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CONTRIBUTION BY DR ROY L MOODIE

DEPARTMENT OF ANATOMY, UNIVERSITY OF ILLINOIS

PRIMITIVE SURGERY IN ANCIENT EGYPT

Summary Paucity of evidence of surgical knowledge among ancient Egyptians—circumcision a common practice. Oral surgery indicated by a single example in the Old Empire although diseases of the teeth were widespread and severe. The oldest known splints—similarity of the bark splints of the present-day Abyssinians—their function more that of protection to the wounded limb than of support to the fractured bones. Surgical instruments of metal and orthopedic appliances unknown in ancient Egypt. Trephining an undeveloped art. Earliest example of atheroma in ancient Egypt discovered in the aorta left by careless embalmers in the body of the Pharaoh of the Exodus. Some knowledge of surgical anatomy indicated by embalming methods in which the brain was sometimes withdrawn through the nose and the viscera through an incision at McBurney's point.

CIVILIZATION had its origin in and around the region bordering on the eastern and southern coast of the Mediterranean Sea, and in this early civilization the ancient Egyptians played an important role. When the first nomadic tribes wandered into the valley of the Nile we do not know, but present evidences indicate that Egypt has been peopled for the last 12 000 years at least and doubtless longer. Active investigations of the Pleistocene and recent deposits of the Nile valley will establish something of man's antiquity in this region. The earlier periods of Egyptian history, prior to 4000 B. C., are usually spoken of as *predynastic* and this era covered at least 6000 years. Predynastic embalming consisted of wrapping the body in coarse cloth and burying it in the sand of the desert. The surgical procedures were developed after the period of the First Dynasty and are first indicated in the Fifth Dynasty, 2750-2625 B. C.

When or why the ancient Egyptians first undertook the minor surgical procedure of circumcision is not known. In a tomb

were made by some sharp pointed tool to allow drainage into the vestibulum oris (Fig 121 *a*) I have examined the mandible in the Peabody collections at Harvard University, and it seems clear that the deductions drawn by Dr Hooten are correct although it seems rather peculiar that in a people who suffered

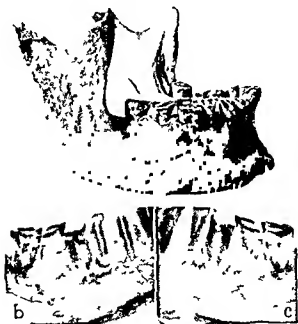


Fig 121—*a* Mandible of an ancient Egyptian from an Old Empire (1500 B C) tomb excavated by G A Reisner at Giza The specimen is from a middle aged male of The Giza Type This jaw exhibits two perforations to drain an alveolar abscess and represents the oldest example of oral surgery *b* Radiograph of jaw from buccal surface *c* Radiograph of jaw from lingual surface

so terribly from alveolar abscesses pyorrhea and dental caries as did the ancient Egyptians there are not more indications of oral surgery Many of the Pharaohs suffered tortures from toothache and had there been any knowledge of dentistry it seems certain that holding the lives of their subjects in their

of the ancient empire (XIIth Dynasty, 2000-1788 B. C.) are depicted several figures of a primitive surgeon in the process of circumcising a youth with a 'sharp-edged flint knife'. From the fact that the bodies of boys eleven to thirteen years of age are found in the graves of ancient Egypt with the fore-skins still intact it is assumed that the operation was not done until some time after puberty. In a prehistoric cemetery at Naga-ed-dér all the male bodies were circumcised. The operation was doubtless similar to the one referred to in the book of Exodus (iv. 25) where *Zipporah the wife of Moses*, 'took a sharp stone and cut off the fore-skin of her son'. This was before the passage of the Hebrews out of Egypt and the Hebrews may well have acquired the ritual from the Egyptians though present knowledge indicates that the procedure arose independently among the two peoples. Certainly archeologic evidences show that circumcision was practised in Egypt prior to the coming of the Hebrews some centuries prior to the XIXth Dynasty 1350-1205 B. C. during which the Exodus took place. It is known to be practised among the primitive negro tribes of Abyssinia, and there is no indication that they were influenced by either the Egyptians or Hebrews. An analogy is to be seen here in the surgical art of trephining which arose independently in western Europe and many centuries later in Peru.

The practice of dentistry in any of its phases has been shown by recent active investigations of many thousands of mummies removed from their resting places prior to the erection of the Asuan dam to have been entirely unknown in ancient Egypt although it is commonly stated that gold fillings have been seen in the teeth of ancient mummies. A single example of a mandible from the Old Empire (1500 B. C.) indicates that the primitive Egyptian surgeon may have attempted to drain an alveolar abscess in the right mandibular ramus (Fig. 121). Certainly the abscess was there and two openings leading directly into it

for its practice Depicted on the walls of tombs and on stelæ and in the skeletons themselves are seen a variety of orthopedic disturbances, such as *talipes equinus*, possibly due to anterior



Fig. 123—The same splints removed from the tomb cleaned and placed alongside the fractured femur. Note especially the pad of cloth wound around the splint to the right of the fractured femur. The reef knot was used in tying the bandage around the rough wooden splints. The remainder of the cloth had disintegrated.

poliomyelitis *genu recurvatum* figured on the wall of an ancient tomb and possibly due to the kick of an ox since many of these peoples were shepherds and a great variety of spinal disturbances

hands as they did, they could have commanded some of their numerous attendants to lay a hand to the offending teeth and



Fig. 122 — Photograph of the most ancient plants found in position on the bones of a fourteen-year-old girl at Nag el edker about 100 miles north of Luxor, Egypt.

drag them from their moorings, but such seems not to have been the case.

Orthopedics also seems to have been entirely unknown to the ancient Egyptians, although there was abundant opportunity

taken from his descriptions and I have copied some of his figures. A set of splints (Figs 122-123) used in a compound fracture of the femur seen on the limb of a girl fourteen years of age, whose body was found in a rock tomb at Naga ed dêr, about 100 miles north of Luxor dating from the Fifth Dynasty (2730-2625 B. C.) is described as consisting of four splints which



Fig. 123—A primitive set of splints showing the use of palm fiber. The mass of palm fiber does not stop here and stop here adhering to the reeds supported front and back by linen.

formed a sleeve or tube around the entire limb, and in no wise prevented shortening of the limb or held the ends of the bones in place. The shortening of the limbs seen in fractured bones is of very common occurrence among the ancient Egyptians, union often being accompanied with the formation of considerable callus and deformation of the bones (Fig. 128). The

which might have been benefited by the application of orthopedic appliances. Some of the ancient Egyptians were so terribly afflicted with joint lesions that for years prior to their death they were totally unable to move or turn their bodies and must have been a constant care to their relatives.



Fig. 124 The fractured femur seen from behind showing loss of substance and nature of compound fracture

We are chiefly indebted to the studies of G. Elliot Smith for our knowledge of the most ancient splints. He has given a most careful account of them and the information given here is

¹ G. Elliot Smith, The Most Ancient Splints, Brit. Med. Jour. 1903, pp. 32-738.

Another set of splints (Fig 126) was applied to the forearm in a case of compound fracture of both bones of the left antebrachium. There is a pad of fiber evidently from the date palm adherent to the fragment of the ulna and its blood stained



Fig 127 —A set of ancient wooden splints (Old dynasty) shown in position around a fractured femur



Fig 128 —An example of vicarious union after fracture of the forearm in a prehistoric Egyptian

condition indicates its use as a means of absorption. The splints consist of three pieces of rough bark arranged in the form of a tube completely around the forearm strengthened by a bundle of coarse grass. Death ensued before healing set in since the bones show no evidences of repair.

splints in the present case, were made of rough unplanned wood, cut especially for the purpose, and roughly adapted to the form of the limb. The strips were wound round with linen and tied firmly to the limb by two reef knots (Fig. 123), above and below the knee. On the wound through which the broken end of the

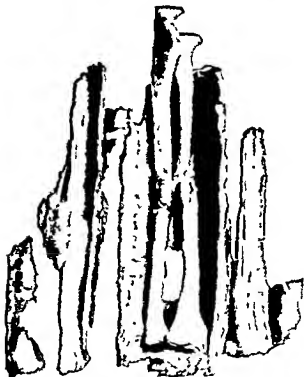


Fig. 176.—Fracture of left forearm set with bark splints with blood stained vegetable fiber for absorption of blood

femur (Fig. 124) had protruded is placed a wadding of linen produced by wrapping a piece round and round the splint and on this was placed a neatly folded bit of linen stained with blood, evidently placed there for the absorption of the extravasated blood.

Another set of splints (Fig 126) was applied to the forearm in a case of compound fracture of both bones of the left ante brachium. There is a pad of fiber evidently from the date palm adherent to the fragment of the ulna and its blood stained



Fig 127—A set of ancient wooden Egyptian splints (5th dynasty) shown in position around a fractured femur



Fig 128—An example of vicious union after fracture of the forearm in a prehistoric Egyptian

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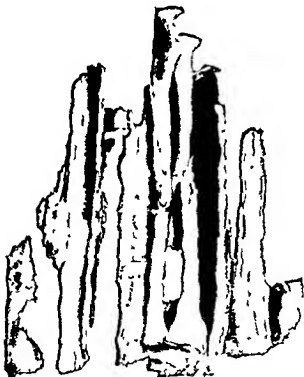


Fig 126.—Fracture of left forearm set with bark splints with blood stained vegetable filler for absorption of blood.

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CLINIC OF DR CHARLES A PARKER

HOME FOR DESTITUTE CRIPPLED CHILDREN

CONGENITAL DISLOCATION OF THE PATELLA

Summary Demonstration of the results of transplantat on of the tib al tubercle in the treatment of d slocation of the patella

THIS little girl is now eight years old and walks into the clinic without limp or apparent disability. She can stand on either foot with the corresponding knee in partial flexion without difficulty or mishap. We first saw her in April 1919 when the mother stated that the right knee cap dislocated whenever she bent her right knee and that the left had a similar tendency. When the child was four and a half years old the mother noticed that the right knee cap was displaced toward the outer side of the joint and later the left was observed to be following the same course. Walking was unsafe and falls were frequent and accompanied by swelling of the joint as the patella jumped off of the condyles. An older sister a victim of multiple arthritis showed similar deformities of the knee but as the arthritis was so severe as to preclude walking dislocation was not observed at the time of the examination.

On examination the right patella was observed to lie obliquely on the external condyle in extension and to slip entirely over to its outer side in flexion. The patellar tendon was apparently longer than usual. A roentgenogram confirmed the outward displacement of the patella but did not disclose any other definite pathology. There was a slight knock knee. At that time transplantation of the patellar tubercle with possibly a correction of the knock knee was advised.

On July 15 1919 under ether anesthesia the following operation was performed. A transverse curved incision extending from the outer side of the tibial tubercle to the inner margin of

Similar splints are in use among the primitive people of Egypt today and examples are seen in Abyssinia of splints which do not vary in their make up from the primitive splints used in ancient Egypt five thousand years ago. In the remote villages primitive barber-surgeons or old women who are adept, make a kind of mat of a number of pieces of palm stick laid side by side in which they wrap the broken limb so as to form a tube around it.

Although the practice of embalming the dead was in vogue for thousands of years in Egypt it was only at a late period in ancient Egypt that there was any withdrawal of organs. The embalmers contenting themselves with wrapping the bodies in coarse garments and burying them in the dry hot sands of the desert where desiccation accomplished the preservation. Later it became customary to withdraw all the organs of the body and even to remove the musculature and pack the body with pitch and sawdust carefully modeling the original form of the body. To this care historian are indebted for an idea of the personal appearances of ancient Egyptian king which are so beautifully depicted in the work of G. Elliot Smith on *The Royal Mummies*. The route followed in withdrawing the brain was through the nasal or the pituitary route the removal being done with a blunt hook. The thoracic viscera were often left intact though for a long period even the arch of the aorta was removed. To the careless neglect of the embalmers who failed to secure the aorta of King Merneptah the Pharaoh of the Exodus 1225 B.C. we owe our knowledge of *atherosclerosis* in ancient Egypt. The abdominal viscera were withdrawn through an incision often made at McBurney's point but occasionally the opposite side was used. The wound was closed after the removal of the viscera not by sutures but by smearing with pitch. The pelvic organs of the female were usually left intact. After the organs were removed they were placed in Canopic jar and liberally smeared with pitch. The jars were then placed in the tomb with the individual.

the tibia was made through all tissues down to the bone. The tibial tubercle with the attachment of the patellar tendon, was then chiseled away from the tibia and displaced inward close to the inner border of that bone and through a split in the periosteum reimplanted and held in place with a flat headed wire nail about 1 inch long. The tissues were then closed and a plaster cast applied (Fig 129)



Fig 130—Patient after operation standing on either leg with knee bent without dislocation of the patellæ



Fig 131—For legend see Fig 130

A similar operation was performed upon the left leg and a cast applied to that one also. The legs were left in casts ten weeks when the casts were removed and walking resumed. Although according to the clinical and x ray evidence the right patella in the resting condition is still displaced laterally it does not dislocate. The left shows no evidence of displacement (Figs 130 132)

On July 25 1919 I operated upon a somewhat similar case in a fourteen year old girl at the Presbyterian Hospital. The

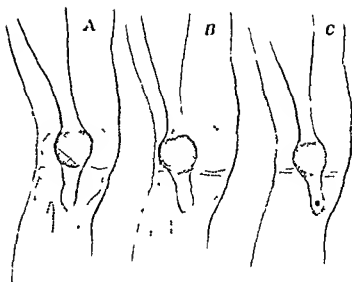


Fig. 129—A B C illustrate the mechanics of outward displacement of the patella and the influence of inward translocation of the tibial tubercle. 1 and 2, Details of the operation: the tubercle has been anchored in position with a nail.

knee was bent to a right angle in fact it lay on the outer side of the condyle most of the time. She fell frequently and had special difficulty going up and down stairs. It was operated upon December 5, 1911.

In this case the first one the inner part of the joint capsule was plicated besides transference of the tibial tubercle.

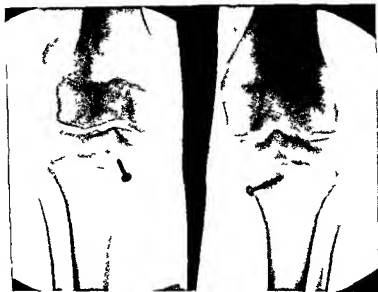


Fig. 133—Roentgenogram showing outward displacement of the left patella with the nails in place after operation. The transplanted tubercle prevents dislocation from this extreme position.

The accompanying photo (Fig. 136) shows her ability to stand on the bent leg when examined about two years later. The patella could not be dislocated manually.

The second case was that of a girl eleven years of age who had recurring dislocation of the right patella. A sister also had a congenital dislocation of the hip. The dislocation of the patella was treated in the same way as the first one by transference of the tubercle and reuniting to the tibia with a nail. The capsule was not touched. A photo a year later shows perfect use

dislocation had been so frequent and so painful in one leg that the patient wore a cast for several months previous to the operation to relieve the pain and swelling of an arthritis. In this patient both knees were involved and only the slightest tendency to knock-knee existed. The operation was in all respects similar to the one described and which I have employed in 3 previous cases (Figs. 133-135).

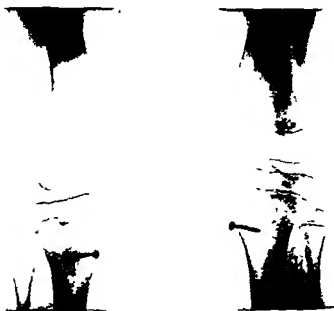


Fig. 132.—Roentgenogram showing outward displacement of the right knee-cap and the nails retaining transferred tibial tubercles. The heads of the nails show the new locations of the tubercles.

The time that has elapsed since these operations is too short to determine the permanence of the relief but the results in 3 other cases similarly treated in 1911, 1912 and 1917 respectively seen two or more years later showed complete relief of the condition, with no dislocations after the operation.

The first case was that of an Italian girl twelve years of age in whom the left patella was dislocated outward every time the

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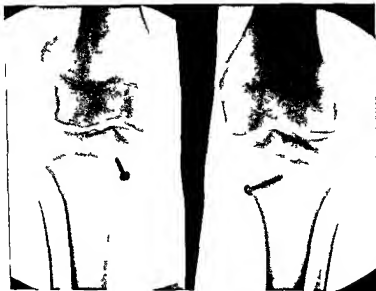


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Fig. 132—Roentgenogram showing outward displacement of the right knee-cap and the nail-retaining transferred tibial tubercles. The heads of the nails show the new locations of the sutures.

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combination of circumstances favoring the displacement. The outer condyle is less prominent, the inner side of the capsule stretched and the patellar tendon usually longer than normal. With the inward displacement of the tubercle and tendon the length of the tendon from its new insertion to its origin in the patella is not enough to allow the patella to be manually or otherwise displaced to the outer side of the external condyle.



Fig. 136—Patient standing on the bent leg two years after the operation.



Fig. 137—Patient standing on the bent leg one year after operation.

I have never had to correct the accompanying slight knock knee observed in some of the cases. Extreme knock knee is rarely accompanied by dislocation of the patella, and correction of the moderate knock knee that may be present is usually not sufficient of itself to cure the dislocation. The nails have never caused any trouble and I have not had to remove any of them later. Should their removal at any time become necessary it could be done very easily.

of the knee and she has had no trouble with it (Fig 134). This patient was seen recently and although not examined appeared to have no trouble with the knee.

The third case is that of a married woman thirty five years old who first noticed her trouble when ten years old. Previous to her operation in April 1917 she had several painful dislocations of her left patella making her walking very uncertain.



Fig 134—The patient is standing rather unsteadily on either bent leg as she was just recently out of the cast. Later the knees have become more stable. There have been no dislocations.



Fig 135—For leg-end see Fig 134.

This was treated by the same operative method and a recent report says she has no further trouble with the knee.

This method is ascribed to Roux of Lausanne and appeals through the simplicity and directness of its mechanics.

The dislocation is almost always outward and is due to a

CLINIC OF DR. KELLOGG SPEED

COOK COUNTY HOSPITAL

INGUINAL HERNIA

Summary Operative technic adapted to anatomic findings in order to avoid recurrences. Use of the rectus muscle in conjunction with the conjoined tendon.

THIS patient has that common condition which brings us so often to the operating room—an inguinal hernia. As I open the skin over the inguinal canal and lay bare the external oblique we catch each bleeding point to avoid soiling the tissues with blood and to make the anatomic distribution clear. By cutting open the roof of the inguinal canal which means splitting and separating the fibers of the external oblique muscle in the direction of its long fibers we expose the cord and deeper anatomy of the inguinal region. At this point ceases also the *common* technic we apply to all inguinal hernias. I say that in spite of the fact that I use most of the time the Andrews imbrication operation for the cure of hernia but as its honored originator intended we try to use such modifications of the technic as the individual's anatomy demands and we seldom do two successive herniorrhaphies in precisely the same manner as far as the abdominal muscles used in the approximation are concerned. Many surgeons have learned a technic for herniorrhaphy and they abide by it through year after year of practice failing to employ useful adaptations of the anatomic material at hand in the operative field and to improve their mental grasp of the performance of this common and necessary plastic operation.

We vary our technic because we think we have to—we hope thus to obtain the minimum of recurrences, the practical possibility of recurrence is emphasized for us because we are forced

we find the conjoined tendon with its red fibers passing across from their insertion into the rectus sheath over to Poupart's ligament some $2\frac{1}{2}$ inches above the pubic bone. This leaves a space of at least $2\frac{1}{2}$ inches between the edge of the rectus and

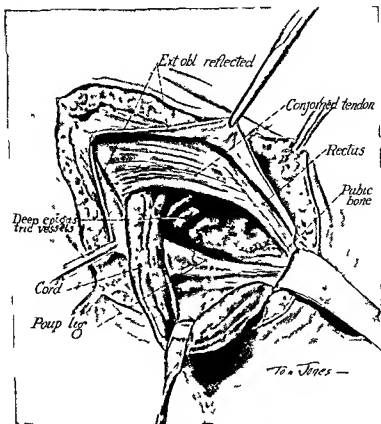


Fig 138—Surgical anatomy of inguinal canal in a case with marked deficiency of conjoined tendon

Poupart's ligament which has no firm muscle and fascia wall to hold back the abdominal contents. When I press on the abdomen above we can see a distinct bulging effect in this weak triangular area. The patient then has a distinct indirect hernial sac

to reoperate so many times in this institution on the poor results obtained by a host of operators who seem to cling to herniorrhaphy performed by a hide bound rule considered equal to any patient's necessity. It is not my intention today to go into the complete technical detail of the average herniorrhaphy which has been so ably described by Dr. Andrews himself in this clinic but rather it is my wish to call your attention to points of variance as illustrated by this or any patient we incise for radical cure. No two are the same any more than the temperature curves of any two typhoid patients are the same and in a progressive spirit let us examine this patient as we go along and consider the points his anatomy bring before us.

The inguinal canal has been opened by splitting the external oblique and we believe from the preoperative examination that we are dealing with an indirect or oblique hernia. By any method one desires the sac can be identified and its isolation from the rest of the cord can proceed. We usually insert the index finger beneath the cord just before it passes over the pelvic margin and lift it from its bed by separation of the tissues which furnish a natural plane of cleavage here. The sac of an indirect hernia is then seen or if covered by cremasteric fiber the fibers are incised in the long axis of the cord until the whole cord can be spread out fan like so that its different tissues can be easily inspected. We find here a well-developed indirect sac $2\frac{1}{2}$ inches long which can be stripped by means of gauze dissection from the remaining cord tissues composed of vas, vessel, cremaster muscle and connective tissue. In only one place is the sac so adherent that it must be separated by a light knife stroke. This dissection is carried well up and beyond the orifice of the internal ring by making traction on the loosened sac. Before going further with the sac I will stop a minute to point out the surgical anatomy present (Fig. 158). At the under border of the sac neck you see plainly the two deep epigastric vessel, vein and artery. Under the lower flap of reflected external oblique muscle at its insertion is Poupart's ligament. Across the lower extremity of the wound opening is the pubic ramus. Along the inner side passes the rectus muscle in its sheath and higher up

herniorrhaphy occurs usually at one of two points First at the internal ring and second in the area described at the lower angle of the inguinal region above the pubic bone through which we may thrust an examining finger

To avoid recurrences then we must consider these two spots minutely and determine in each and every herniorrhaphy which procedure in the plastic closure will give the least chance of return Incidentally we must remember that herniorrhaphy is in reality a plastic operation in the performance of which an attempt is made to cover a weak spot which is subject to almost constant pressure and change of tension after the patient has been operated on and permitted to walk about Consequently we must give these muscular tissues which are applied to Poupart's ligament an opportunity to heal in their new position by adhesion of muscle to ligament to be able to bear these tensions without giving way We must therefore keep these patients on their backs until this adhesion will hold—two weeks in bed for a double herniotomy is not too long then two to four weeks of very careful walking and sitting before much freedom is allowed That will help reduce the recurrences to some degree

The main faults however lie in the closure of the points described at the upper and lower angles of the wound Thorek¹ claims practically 100 per cent of cures in 600 cases because while he pays attention to closure of the lower angle of the hernial area he puts much stress on the treatment of the sac neck His advice is to separate cleanly the sac blood vessels and vas of the cord with removal of all connective tissue so that when ligated the stump sac falls back into the abdomen between the vas which comes out at the lower end of the opening in the transversalis fascia which we call the internal ring and the cord blood vessels which come out at the upper end of the opening At the point on the intra abdominal surface where these two cord elements meet at an angle he believes the infundibular like protrusion of the peritoneum tends to cause recurrence To obviate this he advises that two stitches for the union between muscle (conjoined tendon) and Poupart's ligament be placed

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which has already been dissected free and when we come to observe his anatomy closely we find that he has also a potential and already inaugurated hernial protrusion in the area of direct hernia which was not mentioned in the clinical history.

The muscular deficiency here is not determined in the absence of definite hernia by a bulging when the patient stands or an impulse on coughing but by palpation of the examiner's index finger through the invaginated scrotum into the external ring. If the conjoined tendon is deficient one finds little resistance at the external ring and the finger may pass in over the pubic ramus behind the rectus muscle. That is exactly the type of muscle deficiency we have in this patient. If it were equal on both sides in this case fingers inserted into the external inguinal ring could meet behind the rectus in the space of Retzius.

Shall I proceed now to ligate the sac high up after transection remove any inguinal lipomata present¹ and then take *this very thin and high attached conjoined tendon and try to stretch it down to Poupart's ligament as in the routine Bassini operation*. This brings us to the very point I mentioned after opening the canal—we judge each hernial region on its own anatomy and do not attempt to perform any fixed operation. No predetermined technic will fit every case. Some conjoined tendons are muscular are attached low down on both the rectus and ligament side (Poupart's) others are thinner and attached higher as in this patient still others are completely lacking—there is no muscular conjoined tendon present in the area of hernia and no muscular tissue is found below the site of the internal ring at all except the rectus toward the median line.

If there is this anatomic variation how can we use a uniform operation for bringing the conjoined tendon to Poupart's ligament to effect repair? We cannot do so and an analysis of recurrences after herniotomy should teach us the folly of such an attempt. We can ignore those recurrences caused by infection with sloughing of tissues and sutures. Let us consider the recurrences following clean operation. In the hands of good operators they are less than 1 per cent. Recurrence following

¹Speed Surg. Gynec. and Obst. September 1914 7

attempting to draw the muscle down in any of the ordinary types of herniorrhaphy. When the conjoined tendon lies so high it is usually deficient in quality as well as quantity and its thin fibers will not stretch out to cover any great deficiency. It is not a sutural defect which causes recurrence in these cases as much as it is a muscular defect. The conjoined tendon does not furnish enough muscle to suture to Poupart's to cover this weak area and if improper protection by muscle plastic is given this lower angle we can look for recurrences of the direct type.

We must consequently obtain suitable muscle covering for this area. If we free and mobilize the conjoined tendon from its insertion into the rectus sheath to bridge too large a gap we injure its anchorage and defeat our intention of muscle covering just as much as if we stretch the muscle until its fibers separate. In operations for recurrent hernia we too frequently find the conjoined tendon obliterated or so deficient that it has no plastic value then we *must* have recourse to the rectus. If we use the rectus more in the first place we surely will have fewer recurrences.

Halstead first advised opening the anterior rectus sheath near the edge to expose the muscle fibers for use. Some operators condemn this method because a small opening which would not interfere with the insertion of the conjoined tendon into the rectus sheath would not permit the escape of sufficient rectus fibers to close the deficient area. If the sheath alone is used that procedure can be questioned because at this low level of the rectus there is no posterior sheath and the cut edge of the sheath freed anteriorly has no anchor in the linea alba to draw upon. Consequently from an anatomic viewpoint it is best to use the whole rectus sheath and all drawing it over to Poupart's ligament firmly (Fig 139). We never use non absorbable sutures here that is a matter of personal choice we believe and results with kangaroo tendon are reliable. The approximation of *conjoined tendon and of rectus where it is needed* must be clean and firm and not under such great tension that stitches will pull through. Under no circumstances must there be interlving

between the points of exit of vas and vessels of the cord separating them by a muscular wall which blocks off the tendency for a funnel-shaped protrusion of the peritoneum. This may be a most valuable procedure in some instances but it often involves more dissection than is needed and exchanges two points of exit for one of vas and vessels combined. It is our custom to dissect the sac high up and tie it high and then make the internal ring closure snug enough to warrant little chance for subsequent peritoneal protrusion. It has been my experience that but a small percentage of recurrences come from this area and the cause described. Bloodgood¹ also believes that recurrences from the upper angle are in the minority are small and rarely lead to secondary operation. He favors Halstead's idea of excising the veins of the cord to reduce its size *i. e.* to make a snugger internal ring. We must consider the use of this permanent separation by muscle suture of the vas and cord blood vessels at the internal ring for some cases rare ones in our experience but we must always cling to a snug closure of the internal ring.

The second point of weakness at the lower angle of the hernial area is the most important. It is on that account that our herniorrhaphy must not be according to rule but according to the anatomic findings. We must make it a hard and fast rule to suture muscle to Poupart's ligament *all the way down to the pubis* so that recurrences of *direct* type may not follow. You understand that I mean to say that the recurrence following an *indirect* hernia may be a direct hernia because of this omission. We find it so in the clinic frequently.

The position for the cord by transplantation or non transplantation has little bearing on the lower angle recurrences provided the rule of muscle closure down to the pubic bone is adhered to.

If the conjoined tendon as in this patient is deficient if there is a space $2\frac{1}{4}$ inches across between Poupart's ligament at its insertion into the pubic bone and the lower edge of the conjoined tendon this cannot be bridged safely and securely by

¹ Annals of Surg. Vol. No. 1 81

fat connective tissue or cremaster muscle from the cord between the surfaces brought together by our plastic

We rarely excise the veins of the cord unless they are quite bulky or varicose. Hydrocele from vein excision seems improbable. I have never seen it but I have seen it following ligation of the distal portion of an unobliterated tunica vaginalis testis in a congenital hernia. In that type we either leave the lower portion of the sac around the testis wide open or better turn it completely inside out around the testicle as in the bottle operation for hydrocele.

There are no unalterable rules about cord transplantation. Usually we do not transplant the cord when there is a good conjoined tendon which is firm and can be mobilized without severing the insertion to the rectus so that it can be drawn to fit down to Poupart's ligament and the pubic bone then we leave the cord in its bed after sac disposal if the hernia is indirect. In such findings of course there would be absolutely no need of utilizing the rectus muscle.

In direct hernia I usually transplant the cord—because we have a deficient conjoined tendon. Likewise—when the weakness at the lower angle of the inguinal area is caused by obliteration of the conjoined tendon or when this tendon cannot be properly mobilized to furnish complete covering and the rectus must be used—then the cord is transplanted. A firm wall of muscle then lies beneath the cord extending to Poupart's ligament and down to the pubic ramus through which hernial protrusion can occur in but rare instances as there is no cord seeking exit at that point to weaken the line of approximation.

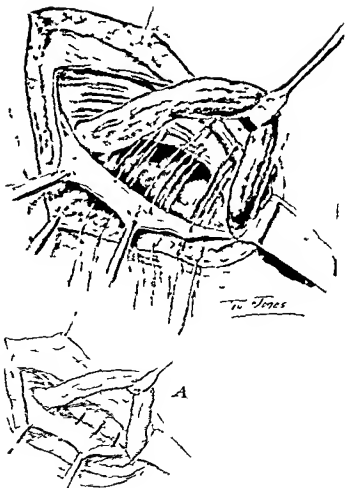


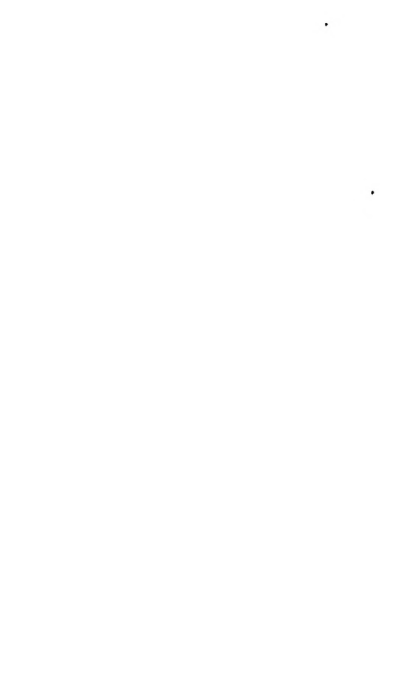
Fig 139—Method of closure of inguinal canal with actual or potential

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CLINIC OF DR. DAVID C. STRAUS

COOK COUNTY HOSPITAL

SUBDIAPHRAGMATIC ABSCESS—TRANSPLEURAL DRAINAGE OF A CASE DUE TO ABSCESS OF THE LIVER

Summary Etiology differential diagnosis and pathologic anatomy of subdiaphragmatic abscess Tropical liver abscess—diagnosis relation to subdiaphragmatic abscess Treatment Surgical anatomy and technique of operations for drainage The perpleural route End results

THE patient about to be operated upon came to our service transferred from the Medical Service of Dr. Ludwig Loeb, with the diagnosis of abscess of the liver. He is a white male, aged fifty-two years, married, and a clerk by occupation. He entered the Cook County Hospital September 11, 1919. The complaints that caused him to come to the hospital were pain in the chest and abdomen, cough, shortness of breath, jaundice, and clay-colored stools.

He was in good health up to one year and a half ago, when he went to Central America and there developed malaria and a few weeks later amebic dysentery. He had severe diarrhea with tenesmus and blood in the stools. After being treated by several injections of emetin he was apparently cured. About two months later he returned to Chicago and here gradually developed jaundice, accompanied by no pain, but with a feeling of weakness, malaise, and uneasiness. This attack of jaundice lasted about six weeks and then completely disappeared. Being then apparently well, he returned to work until six months ago, when the present condition began.

About six months ago he developed pain in the right upper quadrant of the abdomen, associated with chills, fever, and sweats. The chills subsided several weeks ago and are not now present, but the pain and fever have continued and are now the

same as at the time of on-set. The pain is dull in character and constantly present, does not radiate and does not seem to be influenced by rest, exercise, eating or bowel movement. It is made worse by pressure over the lower costal border. It is so severe that it prevents him from sleeping. Cough developed about the same time as the abdominal pain—about six months ago—and has persisted as a dry, hacking, unproductive cough present chiefly at night when he lies down or when he takes a deep inspiration. About six weeks ago he developed pain in the thorax over the right apical region. This is still present, is continuous, sharp and is not influenced by breathing. Jaundice associated with clay-colored stools developed about fifteen months ago, lasted about six weeks and then suddenly disappeared. He has had a somewhat jaundiced look again since the on-set of the present complaint. There is also gradually increasing weakness and emaciation. Shortness of breath has developed recently.

His previous history shows that he had gonorrhea and herpes progenitalis twenty-five years ago, but he denies ever having had a chancre or any other evidence of syphilis. He has a wife and 3 children, all living and well, and there is no history of any miscarriage. A Wassermann test, done while he was on the medical service, gave a negative result. Except for the usual diseases of childhood, there is no history of previous disease except the malaria and amebic dysentery already mentioned. He drank heavily of whisky, wine and beer until a few years ago, when he reformed. He abstained until six weeks ago, when, after indulging in an excess of whisky, he developed the pain in the right side, which is his chief complaint.

On entrance into the hospital he did not appear seriously ill, but his condition is getting progressively worse and he now looks very sick. Otherwise the physical findings have remained about the same. You will note the peculiar color of the skin, not a true icterus, but a more dirty, grayish yellow. This is characteristic of liver abscess. Head and neck show nothing abnormal except this discoloration of the skin and a slight sub-icteric hue of the sclera. Examination of the chest shows nothing

ing abnormal except that liver dulness extends abnormally high both anteriorly and posteriorly and I shall speak of this in detail in a moment. Vocal and tactile fremitus and breath sounds are diminished or absent over this area. Otherwise there are no abnormal areas of dulness, no rales, no increased fremitus, no bronchial breathing. The shortness of breath and cough are evidently the result of the extremely high position of

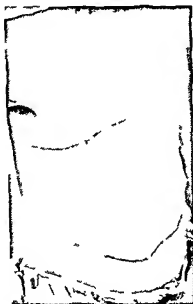


Fig. 140.—Outline of area of liver dulness on percussion. This reaches as high as the third rib anteriorly. Photograph taken the day before the operation.

the diaphragm which mechanically interferes with respiration. Examination of the heart shows the left border to be in the nipple line, the right border at the right sternal margin, and the base in the second interspace. There are no murmurs, no arrhythmia, accentuated sounds, or rubs.

Abdominal examination shows tenderness over the liver and epigastrium, also over the lower portion of the chest on the right

side, especially anteriorly in the region of the costal arch. There is fulness in the right upper quadrant apparently due to the greatly enlarged liver which can be plainly palpated extending to the level of the umbilicus. Its surface is smooth and the consistency is firm. Percussion shows the upper border of liver dullness as I have it outlined on the patient's body (Figs. 140-141). Diagrams and notes made in the records of the medical service

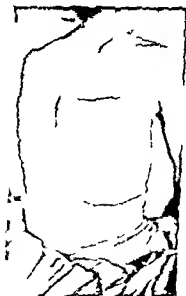


Fig. 141.—Outline of area of liver dullness on percussion. This reaches as high as the fifth rib posteriorly. Photograph taken the day before the operation.

show that they found them to be almost the same. You will note that the upper border of liver dullness reaches to the third rib anteriorly at the point where the liver dullness meets with the cardiac dullness. Proceeding laterally it curves gently downward toward the midaxillary line where it is at its lowest to the axilla again posteriorly where it again arches upward in a gentle convex curve the highest point reaching the fifth rib. The

lower border of liver dulness reaches to the level of the umbilicus anteriorly and the lower margin is plainly palpable where you can see the marks on the patient. The spleen is palpable 3 cm below the costal arch probably the result of the former malaria for in liver abscess the spleen is not as a rule enlarged. No other tumors are palpable. Slight shifting dulness in the flanks suggests fluid. Genitalia and extremities show no abnormalities. All reflexes are normal. Rectal examination is negative.

The blood pressure on admission was 115 systolic and 70 diastolic. A blood examination made September 13th showed hemoglobin 60 per cent, red blood count 4 000 000, white blood count 39 100, differential count: small mononuclear lymphocytes 11 per cent, large mononuclear lymphocytes 4 per cent, polymorphonuclear neutrophils 77 per cent, eosinophils 2 per cent, basophils 2 per cent, transitionals 4 per cent. There was no abnormality of the red cells. Urinalysis shows color normal, specific gravity 1007, reaction acid, a trace of albumin, no sugar, and microscopically a considerable number of leukocytes and many hyaline and granular casts.

The temperature chart shows an up and down curve varying from normal or slightly subnormal in the morning to a little over 99° F in the evening, once only reaching 101° F and only a few times reaching 100° F. His pulse ranges from normal to a little over 100 but usually is between 80 and 96. Respiration has not been increased, the usual reading being 20 to 24. Urination and bowel movements have been normal.

Here is an x-ray plate (Fig 142) taken while he was on the medical service. The clinical diagnosis sent down to the roentgenographer was suspected hepatic abscess. You can see the stomach was filled with an opaque meal. The findings recorded by Dr. Blaine read as follows: The right diaphragm is seen to be unusually high and no activity of the same was seen on deep breathing. The lung is clear above the diaphragm. The stomach was seen to be displaced to the left. The findings would corroborate a diagnosis of subphrenic abscess.

Since the patient has been in the hospital he has been growing gradually weaker. As the medical service felt sure that pus

was present they very properly did not make a diagnostic puncture. I wish to take this opportunity to emphasize the great



Fig. 142.—Roentgenogram taken with the stomach filled with a barium meal. Note how the stomach is displaced to the left. Fluoroscopic examination at this time showed the diaphragm displaced upward to the third rib on the right side and immobile. No fluid in pleural cavity. Lung negative.

danger to a patient of making a diagnostic puncture in these cases and then waiting till later before resorting to surgical

intervention. Such a procedure is to be emphatically condemned. *Never make a diagnostic puncture in any case of suspected liver abscess or subphrenic abscess unless you are prepared to proceed immediately to operate and drain.* As I shall begin by making a diagnostic puncture to locate the pus I shall say more about diagnostic puncture in these cases in a few moments.

Yesterday I had the stools examined for amebæ but, as I expected none were found for the patient has had no diarrhea since he was in Central America and it is the rule to have a liver abscess develop long after the dysentery has disappeared.

Yesterday also I had an x ray plate taken giving particular attention to the right side of the diaphragm the subphrenic space and liver below and the right pleural cavity and right lung above (Fig 143). You will note that the right side of the diaphragm reaches up to the third rib. Fluoroscopic examination showed it to be immobile. Above the diaphragm the pulmonary area is seen to be less clear than normal but no area of consolidation is seen and there is no evidence of fluid in the pleural cavity. The left pulmonary area is clear. Below the diaphragm one can make out merely a large evenly black area. One cannot tell from the plate whether this is due to a greatly enlarged liver alone or to liver with fluid above it. Both liver and fluid have the same density as far as the x ray is concerned so that below the diaphragm one cannot differentiate fluid from the solid viscera. Above the diaphragm however one can differentiate sharply between fluid and lung tissue for the latter has a markedly less density—the fluid is in marked contrast to the air containing lung. From this x ray plate we cannot tell whether we are dealing with merely a greatly enlarged liver or with a subphrenic abscess which is pushing down an enlarged liver (there is no doubt but that the liver is enlarged). Frequently in cases of subphrenic abscess we find in our roentgenographic examination an area of decreased density immediately below the diaphragm and at its highest point due to gas floating above the pus. This finding is particularly striking on fluoroscopic examination for when the patient is turned on one side the gas changes its position always remaining at the highest point.



Fig. 14.—Roentgenogram taken the day before operation. The diaphragm is displaced high up on the right side to the third rib. No fluid in the pleural cavity. Lungs normal. Liver greatly enlarged. Fluoroscopic examination showed the right side of the diaphragm immobile. 1, 2, 3, Anterior extremities of first, second, and third ribs respectively. D, Dome of left half of diaphragm at the level of the sixth rib. A, Air in stomach and colon.

This may be gas or air escaped from a perforated ulcer (most commonly the stomach—from a perforated gastric ulcer)

or to gas formed by gas-producing bacteria (most commonly *Bacillus coli*—in suppurative appendicitis cases) This plate shows absolutely no suggestion of gas below the diaphragm When fluid with gas floating above it can be made out in the fluoroscopic examination a positive diagnosis of subphrenic abscess can, of course be made In other cases it is often difficult to make a positive diagnosis of subphrenic abscess

In the case before us the history and findings are typical of liver abscess We have all the characteristic findings as well as the history The combination of enlarged liver, pain in the liver area, tenderness on pressure over the liver, fever leukocytosis, a peculiar but not at all truly icteric color of the skin and sclera, gives us all the characteristic findings of the symptom complex

Without enumerating all the possible causes of liver abscesses, it may be of interest to mention the relation of liver abscess to dysentery, since this case followed an attack of dysentery Amebic and bacillary dysentery show very different clinical and histologic pictures and have a very different relation to liver abscess

Bacillary dysentery is caused by four closely related species of bacteria the bacilli of Shiga Kruse Flexner Strong and the Hiss Russel Y bacillus That caused by the Shiga Kruse bacilli is the most severe and shows a high mortality and frequent complications In bacillary dysentery the changes are superficial and tend to remain localized in the mucosa particularly about the ileocecal valve Severe nervous and toxic symptoms myelitis and neuritis are common in bacillary dysentery, but do not occur in amebic dysentery In bacillary dysentery liver abscesses are rare and when they do occur are usually multiple small abscesses and not a single large abscess, as is the rule in amebic dysentery Buchanan did not find a single case of liver abscess in 1130 cases of bacillary dysentery Thole believes that it is still questionable whether or not the bacteria causing the dysentery are the cause of the abscesses when they do occur, for the bacteria which cause bacillary dysentery have never been



Fig 143 Roentgenogram taken the day before operation. The diaphragm displaced high up on the right side to the third rib. No fluid in the pleural cavity. Lungs normal. Liver greatly enlarged. Fluoroscopic examination showed the right side of the diaphragm at not level 1 2 3. Anterior extremities of first, second and third ribs respectively. *D* Dome of left half of diaphragm at the level of the sixth rib. *A* Air in stomach and colon.

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found in the pus or walls of the abscesses. The only bacteria found have been the *B. coli* and streptococci.

Amebic dysentery is caused by the *Entamoeba histolytica* dysenteriae of Schaudinn. It causes deep ulcers particularly in the rectum and sigmoid flexure, the amebae entering the submucosa by way of the glands cause necrotic ulcers that may reach even to the serosa. From these intestinal ulcers the amebae enter the veins of the intestine and are thence carried by way of the portal vein to the liver. It is still not known with certainty whether the amebae or the intestinal bacteria that are carried along with them are the cause of the abscesses in the liver. However, in fresh abscesses amebae alone have been found. By the time cases come to operation the pus is very often but by no means always, sterile. It is probable that as time passes the amebae die off. Rogers found the pus sterile in 80 per cent. of the cases. Giordano in 72 cases found the pus sterile in 58.4 per cent., amebae in 20.7 per cent., and bacteria in 9.6 per cent. Among the bacteria that have been found to occur are *Staphylococcus albus* and *aureus*, *B. coli* and pneumococci.

The commonest complication of amebic dysentery is abscess and about 85 per cent. of all tropical liver abscesses result from amebic dysentery.

Tropical liver abscess is almost always a solitary abscess though in some cases there may be several. It is usually located in the upper part of the right lobe near the convexity, particularly near the posterior axillary line beneath the ninth and tenth ribs. According to Thole they occur in the right lobe in 95 per cent. of the cases.

Clinically, abscess of the liver is rarely observed as early as one to three weeks after the onset of the dysentery. It usually develops much later and may appear only after the lapse of years. A few cases have been reported in which it occurred even ten to twenty years after the dysentery. If the dysentery has been very mild, the liver abscess may apparently be the primary disease, and this may account for the so-called idiopathic liver abscesses. While the case we have here shows a classical example as far as the symptoms and signs are concerned all cases

are by no means so easy to diagnose. They may pursue an absolutely symptomless course. Rous found the disease latent in 33 per cent. of the cases.

The peculiar facies we see in this man, the yellowish but not typically icteric pale color of the skin, which has been compared to dirty wax, the emaciation with deep sunken eyes with their waxy subicteric sclera, is so typical that it has been described as a liver abscess facies.

The triad upon which the diagnosis is chiefly to be based, and may be considered as the symptom complex, consists of *fever*, *enlarged liver*, and *liver pain*. Rous found this symptom complex incomplete in 79 per cent. of cases and complete in only 8 per cent.

There may be no fever, though it seldom is absent entirely. There is nothing in the type or course of the fever that is characteristic. As a rule, however, the fever is not high, and there is a tendency toward an evening rise, ordinarily not much over 100, just as in this case. Early in the disease the evening rise is often higher. A continuous higher temperature is rare. In chronic cases fever may be absent for long periods. In the more acute cases the fever may be intermittent and make one think of malaria, but as mentioned before, in liver abscess there is, as a rule, no tendency for the spleen to be enlarged. At the time of onset the fever is not infrequently associated with chills, just as occurred in this case before he entered the hospital. If chills occur later in the disease it suggests that new abscesses are forming. The value of the fever as a diagnostic point in association with an enlarged liver is not of as great value as one might on first thought imagine, when one stops to recall that fever also occurs at times in other diseases of the liver in which that organ is enlarged, as for example, syphilis, carcinoma, sarcoma, and hypertrophic cirrhosis.

Enlargement of the liver is always present in cases of solitary liver abscess. In cases with multiple small abscesses there need not necessarily be any enlargement of the liver. At the time of onset there is a diffuse hepatitis and the liver is enlarged in all directions, the lower border is felt to be rounded, and there is

bulging of the lower intercostal spaces on the right side of the thorax. Later the enlargement may be upward or downward depending upon the location of the abscess. Most commonly the abscess is located in the upper convex portion of the right lobe and pushes the right half of the diaphragm upward just as in this case (Figs 142, 143) and the upper border of the liver is convex upward and generally reaches its highest point in the posterior axillary line (Fig 140) and falls off obliquely toward the vertebral column. This part of the upper border of liver dullness is not typical in this case (Fig 141). The entire liver is pushed downward just as in this case. When as occurs in about one-third of the cases the abscess lies near the concavity of the liver the epigastrium is bulged forward. When the abscess is very large pressure on the portal vein may cause ascites. Some suggestion of ascites is present in this patient.

The third important symptom spontaneous liver pain and pain caused by pressure, is of great value in making the diagnosis. However according to Rous and Chvostek it is absent in from 15 to 28 per cent. of the cases. The pains vary greatly in intensity usually when the patient is quiet they are not severe but may be so intense as in this case that they keep the patient awake at night. The pain is often local and in a general way indicates the location of the abscess. When the abscess is located in the upper portion of the right lobe—the commonest location—the pain often radiates to the right shoulder blade as in cholelithiasis. As already mentioned we have pain radiating to the shoulder in this patient and it may be of interest to mention that the admitting room diagnosis in this case was chronic cholelithiasis with hepatomegaly. According to Frock this radiation of the pain to the shoulder occurs in 13 per cent. of cases while according to Kramm it occurs in 50 per cent. When the abscess lies well in the middle of the right lobe its location can often be determined by the pain caused by deep pressure in the intercostal spaces. If a perihaptic friction rub chances to be present this will also aid in the localization. In this case no friction rub is to be heard but pressure over the lower ribs near

the axillary line greatly increases the pain though there is tenderness over the entire costal arch

Among other important symptoms must be mentioned *interference with respiration* This may be due to reflex immobility of the diaphragm or due to inflammatory paralysis Further more in a case where the diaphragm is displaced as far upward as in this patient it may be due to mere mechanical compression of the lung In the cases where a secondary pleural effusion is present this still further interferes with respiration but in this patient there is absolutely no pleural effusion You will recall that one of the patient's complaints on admission was shortness of breath yet except for the great displacement upward of the diaphragm the lungs are entirely clear (Fig 143)

Marked leukocytosis is almost always present according to Axisa in 80 per cent of the cases The count is usually from 15 000 to 20 000 While a high leukocyte count is of great value in differential diagnosis lower counts do not speak against a diagnosis of liver abscess Thole points out that it is just in the cases where the differential diagnosis is difficult that the leukocyte count is of no help for in cases with slight temperature and slight local findings the leukocyte count is not high whereas in cases of malignant tumor of the liver associated with fever a high leukocyte count may be present Williams too states that neither the relative nor absolute increase in polymorphonuclear leukocytes is of any aid in differentiating between inflammatory conditions and tumors of the liver In this patient as I stated before there is a leukocyte count of 39 100 Such a hyperleukocytosis is of course of great value in substantiating a diagnosis of suspected liver abscess

The physical findings as well as the results of the roentgenologic examination are such that a diagnosis of subphrenic abscess has been suggested and it must be seriously considered As I mentioned before from the x ray findings one cannot be at all sure in this case whether or not a subphrenic abscess is present. A primary subphrenic abscess probably does not exist As a rule the infection is secondary to infection in the abdomen only in a small proportion of cases is the primary focus located in the

thorax. Infection passes much more readily from the subphrenic space into the pleural cavity than vice versa. We know that a not uncommon cause of subphrenic abscess is the rupture into the subphrenic space of a liver abscess and that this usually occurs on the right side because the abscess of the liver is usually in

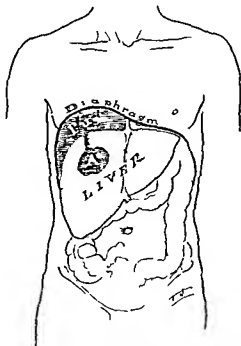


Fig 144.—Diagram to show how an abscess in the right lobe of the liver near the upper convex surface ruptures into the right subdiaphragmatic space and causes a subphrenic abscess, as in the case demonstrated. Note that the pus is held to the right by the falciform ligament, and that we have a right intraperitoneal subphrenic abscess.

the upper part of the right lobe (Fig 144). The only explanation for this occurrence that has been suggested so far as we are aware is that the right branch of the portal vein takes the more direct and vertical course. Whether or not this is the true explanation is very questionable.

The subphrenic space is not one large continuous space but may be regarded as being divided into six subsidiary spaces depending upon the arrangement of the peritoneum in relation to the upper surface of the liver and the lower surface of the diaphragm four peritoneal pockets and two retroperitoneal spaces filled with loose connective tissue. The falciform ligament which attaches the upper surface of the liver to the arch of the diaphragm extending as it does sagittally from the posterior margin of the liver forward to the anterior margin divides the narrow space between the upper surface of the liver and the lower surface of the diaphragm into two halves a right and a left space. Further the right and left portions of the coronary ligament together with the corresponding right and left triangular ligaments divide the right and left space respectively into a large anterior and a small posterior part (Fig 145). These constitute the four intraperitoneal spaces. The falciform and coronary ligaments each consist of two layers of peritoneum and stand at right angles to one another. Where these two ligaments cross a rectangular area exists between them which is extraperitoneal and lies directly between the liver and the diaphragm where these are in direct contact with no peritoneum intervening (Fig 145 5). This is the right extraperitoneal space. The other extraperitoneal space is in relation to the liver only at its left extremity while the greater part is formed by the posterior perireneal tissue (Fig 145 6). This is the left extraperitoneal space. As first pointed out by Maydl and recently emphasized by Eppinger we thus have the possibility of having six types of subphrenic abscess depending in which of these six portions of the subphrenic space the pus is located. It is only when we are

In general however collections to the right or left of the falciform ligament tend to remain as either right or left subphrenic abscess. It is therefore particularly in dealing with small subphrenic abscesses that it is important to know the various possibilities as to location.

The right intraperitoneal anterior abscess (Fig 145 1) usually extends upward to the diaphragm, posteriorly to the right coronary ligament medially to the falciform ligament and laterally to the right wall of the thorax or diaphragm. The abscess is closed off from the general peritoneal cavity by means of adhesions. Where the infection has entered the subphrenic space from behind, these adhesions are usually located along the anterior

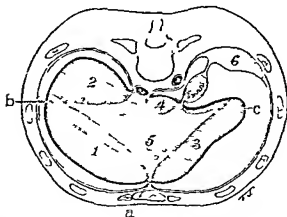


Fig 145

Fig 145—Diagram (after Braun) to show the various areas where small subphrenic abscesses may be located and to which they may be limited. When the collection becomes larger the abscess may spread and occupy more than one of these areas. 1 Right intraperitoneal anterior subphrenic abscess. 2 Right intraperitoneal posterior subphrenic abscess. 3 Left intraperitoneal anterior subphrenic abscess. 4 Left intraperitoneal posterior subphrenic abscess. 5 Right extraperitoneal subphrenic abscess. 6 Left extraperitoneal subphrenic abscess. a Falciform ligament. b Right portion of the coronary ligament and the right triangular ligament. c Left portion of the coronary ligament and the left triangular ligament.

surface of the liver. When the infection has come up from below and in front, the abscess usually extends to the omentum and transverse colon.

The right intraperitoneal posterior subphrenic abscess (Fig 145, 2) is in contact with only a relatively small portion of the diaphragm, the greater portion of the pus being subhepatic, and when completely filled this collection has a more or less pyramidal

form bounded below by a base formed by the lateral wall of the abdomen at the level of the twelfth rib the apex extending around in front of and somewhat to the left of the middle prominence caused by the vertebral column. Anteriorly it reaches to the anterior margin of the liver while behind and below it reaches to the right kidney but more especially to the crura of the diaphragm. To the left the collection is so situated that the pus may easily extend into the lesser peritoneal cavity.

The left intraperitoneal anterior subphrenic abscess (Fig 145 3) is bounded above by the left cupola of the diaphragm as far as the left portion of the coronary ligament medialward by the falciform ligament on the left by the lateral wall of the abdomen and below in part by the upper surface of the liver and in part more anteriorly and below by the upper and anterior surface of the stomach.

The left intraperitoneal posterior subphrenic abscess (Fig 145 4) is bounded laterally by the upper surface of the spleen by the diaphragm above behind by the pancreas left kidney and adrenal and below by the transverse colon.

The right extraperitoneal subphrenic abscess occupies the area between the reflections of peritoneum that form the falciform and coronary ligaments (Fig 145 5). It usually remains localized. It may however extend between the layers of the falciform ligament and ligamentum teres to the abdominal wall toward the anterior mediastinum. Similarly laterally between the layers of the left coronary ligament toward the esophagus or likewise to the right.

The left extraperitoneal subphrenic abscess (Fig 145 6) is not well limited. It exists in the loose retroperitoneal cellular tissue behind the left kidney. These left perinephritic abscesses tend to extend downward rather than upward toward the diaphragm.

Without going into detail we may note that subphrenic abscesses to the right of the falciform ligament are the result of infection from the appendix right lobe of the liver and the gall bladder or right kidney whereas abscesses to the left of the falciform ligament are caused chiefly by infection from the stomach.

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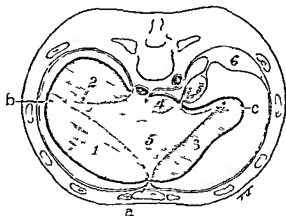


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The right intraperitoneal posterior subphrenic abscess (Fig 145, 2) is in contact with only a relatively small portion of the diaphragm, the greater portion of the pus being subhepatic and when completely filled this collection has a more or less pyramidal

drainage Multiple punctures through the pleura, the diaphragm, and even the lung are said to be without danger. Puncture through the abdominal wall, on the contrary, has been condemned because of the danger of infection and hemorrhage. There can be no question that the diagnostic puncture can be most safely done in the upper posterolateral portion of the liver, for here the liver is in close and firm contact with the diaphragm and abdominal wall. Diagnostic puncture should not be done on the anterior surface or in the left lobe, due to the danger of infection, hemorrhage and possible injury to the stomach, intestines, gall bladder, portal vein, or vena cava. If the abscess is believed to be located in the left lobe or near the under surface of the right lobe, one should perform an exploratory laparotomy. On opening the abdomen it may still be impossible to determine the location of the abscess. But now with the free peritoneal cavity packed off and the liver under control of the eye, puncture can be safely performed. In case of abscess in the usual location, if the puncture be made in an area bounded anteriorly by the anterior axillary line, and posteriorly by the posterior axillary line, and bounded above by a line not over 2 inches above the costal margin, one can enter the abscess at the highest point possible without entering the pleura, except in a minority of cases. It is important that the subsequent operative opening should be high up, for the liver always contracts during the course of healing.

In case a subdiaphragmatic abscess is suspected complicating liver abscess, as in this case the diagnostic puncture can best be made in the same area.

In cases of liver abscess where the findings are not so typical as in this one, the following conditions would have to be differentiated: empyema of the gall bladder, cholangitis, paranephritic abscess, acute pancreatitis, malaria, sepsis of obscure etiology, typhoid fever, miliary tuberculosis, but chiefly empyema and subphrenic abscess. I have already considered the differential diagnosis of these conditions when we looked at the roentgenograms. There are, however, a few points in connection with diagnostic puncture to which I would like to refer. In case the

duodenum, pancreas, spleen, left kidney, and the left lobe of the liver

When a subphrenic abscess is the result of disease of the liver, as may be present in this case, the symptoms of the liver disease predominate, as icterus, enlarged liver, enlargement of the gall bladder, hepatic colic, etc. In this patient we have icterus and enlargement of the liver. In these cases it is usually impossible to determine when the subphrenic abscess began for in purulent diseases of the liver it is, as a rule, only after these have existed for a long time that rupture into the subphrenic space occurs. It is, indeed, almost the rule that the diagnosis of subphrenic abscess is not made until during the course of the operation or even at postmortem.

In this patient the pain in the chest, the extremely high displacement of the diaphragm, marked downward displacement of the liver, even though it is greatly enlarged, with displacement of the stomach to the left (Fig. 142), make it reasonable to suspect the presence of a possible subphrenic abscess, but it is impossible to be certain until operation.

This brings us back to the procedure of diagnostic puncture.

As almost all amebic abscesses occur in the right lobe of the liver it is easy to understand that subphrenic abscesses secondary to tropical liver abscess usually lie to the right of the falciform ligament. The commonest type is in the right extraperitoneal subdiaphragmatic space (Fig. 145, 5) as this space is in direct continuation with the liver tissue. Right anterior intraperitoneal subphrenic abscesses are also very common. Primary posterior intraperitoneal subphrenic abscesses are rare as are also all left-sided abscesses.

It is generally recognized today that both liver abscess and subphrenic abscess call for free drainage by surgical intervention and both can be successfully attacked by similar operative procedures.

As regards diagnostic puncture as a means of substantiating the diagnosis and determining the site of a liver abscess the following points may be stated. As I emphasized before it should only be done when it can be immediately followed by operative

route which is rarely The perpleural and parapleural routes are probably the most used today The operation can often be satisfactorily done under local anesthesia

The most favorable cases for operation are large solitary abscesses of the upper part of the right lobe such as we believe we are dealing with in this patient These are probably best dealt with by the perpleural route either in a one-stage or a two stage operation A one stage operation is the rule While the two-stage operation more certainly protects the pleura from infection the general condition of the patient by the time he reaches the surgeon usually will not allow a delay of a few days We shall make our diagnostic puncture and if we strike the pus here operate perpleurally in this case

In case the abscess lies not in the upper portion of the right lobe but lower down in the right side of the right lobe the parapleural transdiaphragmatic incision is probably the operation of choice An incision is made along the ninth and tenth ribs from the costal cartilages to the posterior axillary line and 4 inches of these two ribs resected One locates the loose cellular tissue between the pleura and diaphragm in the phrenicocostal sinus below the complementary space and loosens the pleura and pushes it upward In this manner one can expose the entire upper surface of the right dome of the diaphragm which is then incised

Operation—We shall now proceed to make a diagnostic puncture in the ninth intercostal space in the right midaxillary line You see we use an ordinary glass aspirating syringe with a long needle of medium caliber The needle must not be too fine I can feel the resistance of the diaphragm as I penetrate it You see we have come upon the pus at once I shall remove the syringe leave the needle in place and allow the pus to escape while I next proceed to resect a portion of the tenth rib We shall send the pus to the laboratory and have smears and cultures made One assistant will hold the needle carefully in place while we proceed to open into the abscess You will note that during each inspiration the pus escapes faster through the needle This shows we are below the diaphragm I make an

needle has penetrated the diaphragm before reaching the pus as in subphrenic abscess or liver abscess the needle will be raised by the diaphragm at each inspiration whereas if we are dealing with an empyema or lung abscess this motion is lacking. The absence of this movement does not by any means indicate that we have not penetrated the diaphragm because as I have previously pointed out, the diaphragm is frequently immobile when there is a large collection of pus below it. Indeed this immobility is often of great diagnostic value as indicating the presence of a subphrenic abscess. Furthermore when dealing with a liver abscess or a subphrenic abscess if the needle is connected with a manometer the pus will show an increase in pressure during each inspiration due to downward pressure of the diaphragm whereas in empyema there is a decrease in pressure at each inspiration.

Prognosis—As regards the prognosis of liver abscess if not operated upon there is no question that small abscesses may heal spontaneously with absorption of the pus and cicatrization of the abscess wall or by calcification of the contents. Spontaneous cure may also result from rupture of the abscess through the abdominal wall or into neighboring viscera. While spontaneous rupture may result in cure in some cases in others it may be the cause of a fatal outcome. According to Thierfelder rupture occurred into the bronchi in 74 cases, into the stomach in 32 cases, into the pleural cavity in 26 cases, into the peritoneal cavity with fatal peritonitis in 23 cases, into the intestine in 13 cases and into the pericardial cavity in 4 cases. But spontaneous healing is rare and should not be waited upon. The indication is to drain the abscess at once.

Similarly the prognosis of a subphrenic abscess is as a rule unfavorable unless promptly opened and drained.

Treatment—Having found pus to be present in the liver or in the subphrenic space one may open and drain 1 Perpleurally : *e* through the pleura 2 parapleurally : *e* around the pleura 3 by means of an abdominal laparotomy (particularly in abscess near the under surface or in the left lobe) 4 by a lumbar incision in case the pus is best drained by this

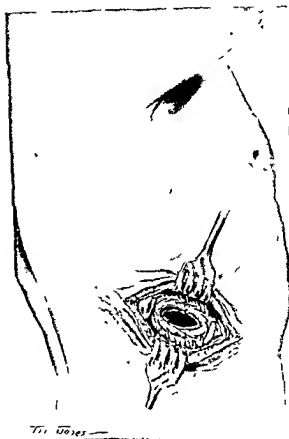


Fig 146—Technic of extrapleural transdiaphragmatic drainage operation for the treatment of subphrenic and liver abscess—subperiosteal resection of the ninth rib in the right midaxillary line. Parietal pleura sewed to the diaphragmatic pleura and diaphragm by overlapping sutures that pass through the intercostal muscles (and periosteum where the stitches cross this), parietal pleura then through the diaphragmatic pleura and grasping a good bite of the diaphragm return outward through these layers thus closing off an elliptic area from the general pleural cavity. Incision through the periosteum, both layers of pleura, and the diaphragm thus opening and exposing the subdiaphragmatic space and upper surface of the liver.

finger now introduced into the enormous space I can feel that the floor of the abscess cavity is roughened. It is apparently

incision along the tenth rib about 4 inches long and cut right down on to the rib. Then while the assistant holds the skin margins retracted upward and downward with a pair of small sharp retractors, I push the periosteum which has been incised the entire length of the incision, upward and downward gaining a subperiosteal exposure of the rib. With this Doyen periosteal elevator I carefully strip off the periosteum from the entire periphery of the rib at this point being very careful not to penetrate the pleural cavity. Then using this Schumacher costatome which as you can see, combines in one instrument a periosteotome and a rib-cutting forceps, I strip the periosteum from the rib backward and forward the entire length of my incision. I cut the rib first anteriorly, and lifting the divided portion somewhat, I divide the rib posteriorly, and remove this 4-cm. long portion of the rib. You see we have not opened the pleura and there is also no bleeding for we were careful to hug closely to the rib and avoid the intercostal vessels. I shall now stitch the parietal pleura to the diaphragmatic pleura so as to close off an area of the pleural cavity, and through this area open the diaphragm and the abscess. You see I use a large fully curved non-cutting needle and heavy chromic catgut and make my stitches overlap. My stitches pass through the intercostal muscles parietal pleura diaphragmatic pleura and into the diaphragm and return. Where the stitches pass over the periosteum they pass right through it. You see we now have a circular area well closed off from the general pleural cavity, and this circular or, rather, elliptic area is as large as it is possible to make in the wound I have exposed. *This man is very large and has a long chest and his interspaces are wide. In many cases indeed as a rule, it is necessary to resect two ribs to secure ample room but that is not necessary in this patient (Fig. 146).*

Now with a scalpel I cut through the periosteum and parietal pleura and expose the diaphragm. Now, cutting deeper, I cut through the diaphragmatic pleura and diaphragm, and you see we are in the abscess cavity. There is surely an abundance of pus. Certainly more than half a gallon has escaped. We purposely have prevented this from escaping rapidly. With my

CLINIC OF DR DANIEL N EISENDRATH

MICHAEL REESE HOSPITAL

THE DIAGNOSIS OF TUBERCULOSIS OF THE KIDNEY AND THE TECHNIC OF NEPHRECTOMY

Summary Suggestive symptoms—necessity of thorough urologic examination
Facts to be learned by each of the special methods of examination Tech-
nic of nephrectomy—position of the patient—choice of incision—exposure
and mobilization of kidney—importance of aberrant vessels—manage-
ment of ureteral stump—treatment of renal pedicle Futility of palliative
treatment of renal tuberculosis

SCARCELY any surgical disease of the urinary tract is so difficult to recognize as tuberculosis of the kidney This is due to the fact that in the majority of cases there are few symptoms which would lead one to think of the kidney as the seat of the disease Bladder disturbances, hematuria, fever of obscure origin, or the syndrome seen in the "silent" cases are very apt to lead one astray in the recognition of this affection A thorough urologic examination combined with a careful analysis of the clinical history will enable one, however, to make a diagnosis in the majority of instances

In looking over a large number of published cases and also those which I have operated upon one is struck by the fact that cases presenting disturbances of the bladder constitute from 40 to 60 per cent of the total number The first symptom which the patients in this group remember is that they were obliged to rise at night one or more times, and then that this increased frequency was observed during the day This diurnal increased frequency alone should direct our attention to the urinary tract Gradually to the frequency is added pain just before or immediately after the act of micturition tenesmus, and the passage of a little blood Later on these symptoms which so closely resemble

the upper surface of the liver which is covered with fibrin. We are dealing with an enormous right intraperitoneal subphrenic abscess between the diaphragm and the upper surface of the liver. I shall irrigate the cavity with normal salt solution until the solution returns clear. I do not find the opening in the upper surface of the liver where the abscess ruptured into the subphrenic space. If I could find the opening I would enlarge it and introduce a drainage tube. But after a liver abscess has ruptured as has happened here the abscess often rapidly shrinks and I believe it would be folly to explore the liver further at this time especially as the patient is in such poor condition. After drainage has been continued some time if he still runs some temperature it may be necessary to do a second operation to further explore the liver. He would be in better condition to undergo such an exploration later. I shall put in two large rubber drainage-tubes, stitch each of them in place with two silk-worm-gut sutures and allow them to remain till the drainage decreases. Later we may replace them with one smaller drainage tube.

After history—The patient left the table in good condition and made rapid progress though he was very weak for a few days after the operation. There was an enormous amount of drainage for days. He was up and about the ward four days after the operation. I was taken ill myself the day following the operation and so could not follow the post-operative course. The record shows however that after he had been up and about he developed some fever. Nevertheless he wanted to go home and did so on October 1, 1919, contrary to the desire and advice of the attending surgeon. It is possible that the abscess in the liver was filling again and should have been operated upon. The subphrenic abscess drained freely the entire time the patient remained in the hospital.

I have written to the patient but he has not replied so I cannot state his condition at this time.

who have analyzed an equally large series of cases. Of great interest are the other groups viz the fourth in which there is a sudden onset of chills and fever with pain and rigidity over the kidney resembling the syndrome of a typical pyogenic infection. These are usually cases of mixed infection the diagnosis in many cases being made only at operation from the appearance of the sectioned kidney or when one finds both the tubercle bacillus and the pyogenic organisms in the pus. In the fifth group the silent cases there is more or less complete occlusion of the ureter. The urine is clear and there are few if any bladder symptoms. The gradual loss of weight and strength accompanied by slight fever and occasionally by dull aching over the kidney region without any apparent local cause should always lead one to examine the abdomen for the enlargement of one or both kidneys. In a sixth group of cases the appearance of a perinephritic abscess or fistula is the first symptom. This is a common mode of onset in children and a bony focus must be excluded as the cause of such an abscess.

As was stated at the beginning of this clinic the history no matter how atypical it may be should lead to a thorough urologic examination. Under this we include at the present time the following

- 1 Examination of the testis epididymis prostate and seminal vesicles preceded by a thorough physical examination of the patient

- 2 Cystoscopic examination

- 3 Ureteral catheterization by means of which urine is obtained from both kidneys for bacteriologic ordinary chemical and microscopic study

- 4 Chemical analysis of the blood especially for the percentage of non protein nitrogen and creatinin

- 5 Estimation of the functional capacity of each kidney preferably by the use of phthalein

- 6 Pyelography using thorium or sodium bromid solution

- 7 x Ray (ordinary)

Time will not permit me to take these up in detail and no doubt the methods are familiar to you. I will however briefly

those of ordinary (non tuberculous) cystitis become so aggravated that a physician is consulted. Unfortunately too few of our profession are aware of the fact that the majority of cases of renal tuberculosis masquerade as cystitis and the treatment so commonly given is that generally accepted as standard for a bladder infection. The urine will usually show a perceptible amount of pus at this stage and if the physician stains the sediment and fails to find the ordinary pyogenic organisms this alone should make him suspicious of a tuberculous infection and should suggest that a more thorough urologic study is needed. In other words a patient complaining of symptoms of cystitis of long duration whose urine does not contain pyogenic organisms and who fails to improve or gets worse after the application of the ordinary treatment should receive a more complete examination.

In a recent paper Braasch found that in 203 cases of this disease observed at the Mayo Clinic the symptoms had existed for more than one year in 71 per cent. and less than a year in only 29 per cent. The sudden onset of bladder symptoms therefore is exceptional. As the disease progresses bladder irritability is accompanied by the passage of urine containing considerable pus and also visible blood either at intervals or constantly.

At times especially in children and young adults there is incontinence of urine either alone or accompanied by the symptoms of cystitis of which I have just spoken.

The second most common group of cases is that in which pain of a dull aching character precedes the symptoms of cystitis. Wildbolz estimates that 43 per cent. of his cases fell into this class. Rovsing about 60 per cent. and Crabtree 35 per cent. The pain is of a dull aching character but when clots of blood or caseous detritus are passed the pain becomes of a sharp colicky

of a calculus
more attacks

Braasch estimates that about 25 per cent. of his cases belong in this group but this view is not shared by the majority of those

organisms in the urine without being able to determine whether they came from a focus in the bladder genitalia or from one or both kidneys. There is some difference of opinion as to the value of the guinea pig test. Some contend that it is indispensable while the majority of urologists believe as I do that it requires too much time (three to four weeks). By the Morton method of increasing the susceptibility of the guinea pig by exposure to x rays this can be reduced perhaps to eight to ten days but even this delay is unnecessary.



Fig. 147. Typical appearance of tubercular abscess. Fairly richly and vascularized soft kidney. Not quite clear but will recognize the outlines of the ureter and calyces. It is not the appearance of a cyst. In the variety of the ureteral changes a number of calyces taper to a point to the left and below is a typical tubercular abscess. (Heitz, *Urology of Cystoscopy*.)

Ureteral catheterization may be impossible on the diseased side owing to the presence of one or more strictures of the ureter but on the non-involved side it gives us much information as to the ability of this kidney to do the work of both if the diseased one should be removed.

I will take up the question of bilateral involvement later in connection with the case which will be operated on today.

Pyelography and Ordinary Radiography—Brusch has recently made some valuable contributions to this portion of the

summarize the principal findings by these methods in cases of renal tuberculosis.

Cystoscopy—In a few early cases this reveals no changes in either the bladder mucosa or in the appearance of the ureteral orifices and one must regard the bladder irritability in such patients as of reflex origin. In other early cases one notes only edema and redness of the ureteral orifice of the affected side. In some this edema may be of the bullous type. These early changes often present nothing pathognomonic of tuberculosis and it is only after the urine is obtained by ureteral catheterization and the tubercle bacilli are found in the centrifuged sediment that the diagnosis may be made. As the disease in the kidney progresses however the bladder changes become so characteristic that the recognition of their tuberculous nature presents but little difficulty to the experienced observer. The presence of ulcerations and occasionally of tubercles on the edges of the ureteral orifice of the suspected side and the corresponding half of the bladder is quite typical. It is well to remember to examine the vertex and anterior wall of the bladder because the most typical ulcers are often found here. Later on the ureteral orifice becomes rigid, grapes and is retracted resembling a golf hole in its appearance (Fig. 147). The bladder wall becomes very rigid and such a high degree of intolerance to fluids develops on account of the many ulcerations and lack of elasticity that a general anesthetic often must be given in order that cystoscopic examination may be carried out, the bladder scarcely being able to hold the 3 ounces regarded as a minimum for cystoscopy. To find the ureteral orifices in these advanced cases requires the utmost patience and dexterity. Every ulcer should be examined for the opening of the ureter.

Ureteral Catheterization.—There is no danger of infecting the healthy kidney by passing a catheter into the ureter of the non-involved side in order to determine the condition of this kidney. From the diseased side one is able to obtain the tubercle bacilli in the sediment after the use of a high power centrifuge in about 90 per cent. of the cases, so that this method has superseded the older one of examining the mixed urine and simply finding the

The physician whom he consulted thought of a specific posterior urethritis and treated him for a time with urethral injections. In spite of this treatment the symptoms became more aggravated and he came to the hospital not complaining of any symptoms referable to the upper urinary tract but to the bladder and urethra. Upon admission his urine was found to contain a considerable amount of pus but no tubercle bacilli. Cystoscopic examination revealed the typical changes of moderately advanced tuberculous cystitis most marked around the right ureteral orifice (compare Fig 147). Catheterization of the left ureter and functional tests showed the presence of a left kidney which was capable of doing the work of both should we decide to remove the right one. By catheterization of the right (diseased) side we found in addition to pus tubercle bacilli. Examination of the external genitalia at this time revealed negative conditions.

At operation we found moderately advanced tuberculous changes in the kidney (Fig 148). The patient made an uneventful recovery so far as the kidney portion of the operation was concerned but his bladder symptoms persisted for a long period. He was given one mesothorium treatment at the Michael Reese Hospital about six months after the nephrectomy but did not receive much benefit. We have found this an extremely efficacious therapeutic measure in many of the cases of tuberculous cystitis subsequent to nephrectomy and will publish our results later.

I did not see the patient again until one week ago. He states that in the interval of eighteen months since the nephrectomy he has gained 50 pounds in weight but he returns to us today on account of an enlargement of the scrotum a perineal fistula and the continuation of some of the bladder symptoms from which he suffered before the operation. Examination reveals in addition to a perineal fistula quite marked typical advanced tuberculosis of both epididymis. Rectal examination reveals a nodule in the right lobe of the prostate and considerable induration of the bases of both seminal vesicles. We are dealing in this case with a condition which may precede accompany or

subject. He found positive shadows due to calcium deposits in 22 per cent. of 131 cases of renal tuberculosis. There were two definite types of deposit: (a) Incrusted ends of calices; (b) caseated areas. The shadows fell under three groups: 1. Multiple small scattered; 2. single or a few localized 1 cm. in diameter; 3. large irregular diffuse areas involving a large portion of or the entire kidney. These last are the so-called putty kidneys.

The first changes according to Braasch seen in a pyelogram in a case of renal tuberculosis are a more marked irregularity in the outline of the calices and a much greater variability in the outline of the calices and a much greater variability in the degree of the dilatation of the individual calices than is seen in the pyelogram of a non-tuberculous inflammatory dilatation of the renal pelvis. As the tuberculous process advances the calices begin to show a moth-eaten appearance and still later one sees irregular often separated shadows scattered through the parenchyma. A ureterogram is also of the greatest value in these cases in revealing the presence of strictures and the degree of dilatation of the ureter. I am now in the habit of employing a 25 per cent. sodium bromid solution in my work in preference to thorium and in the first case to be presented today we obtain a typical picture showing widely scattered shadows in the kidney region indicating a tuberculous pyonephrosis.

CASE I.—The first patient whom I shall show you today was operated on eighteen months ago at the Cook County Hospital. For about a year preceding his admission he had suffered from increased frequency and painful irritation. The onset was quite gradual. He first noticed that he was obliged to get up several times at night to void urine and then that this increased desire began to manifest itself during the day. Gradually the act became painful, the pain being most marked just before and after the close of micturition. In fact the pain toward the end of the act became so severe that it caused the patient to consult a physician. He had occasionally noticed that the urine in addition to being turbid seemed redder but at no time was severe hematuria present.

This may accompany or follow as an independent focus the tuberculous process in the kidney

I will not discuss today the treatment of tuberculous epididymitis. I may say at this time however that my belief in the operative removal of such tuberculous foci remains unshaken after a considerable experience. The frequency with which tuberculosis of the epididymis accompanies or follows a similar disease of the kidney will be taken up in connection with the second case.

CASE II.—This patient was referred for operation from a neighboring state with the diagnosis of tuberculosis of the kidney. The patient is a boy of seventeen who began about one year ago to notice increased frequency and painful urination later accompanied by the passage of blood. He had lived on a farm and always enjoyed good health up to the onset of these symptoms. There was no history of tuberculosis in the family. On account of inability to secure relief from his local physician he consulted a urologist who made the diagnosis of tuberculosis of the right kidney from a cystoscopic examination and the finding of tubercle bacilli in the urine. On account of the debilitated condition of the patient nephrectomy was considered inadvisable and the surgeon simply drained what he considered at the time to be a perinephritic abscess. This did not afford any relief to the bladder symptoms so suprapubic cystotomy was done.

When I first saw the patient at the Michael Reese Hospital a few days ago I found him very much emaciated and anemic. Thick purulent urine escaped from the suprapubic opening and there was an abundant discharge of thin pus from a fistula over the right kidney. Adhering to my rule of making a thorough examination not only of the urinary but also of the genital tract I found a nodulated swelling of the lower pole of the right epididymis and a nodule about the size of a hazelnut in the right lobe of the prostate. The seminal vesicles, left lobe of the prostate and left epididymis were normal. In view of the cystoscopic and operative findings of the urologist who sent the patient there could not be any doubt as to the diagnosis of right

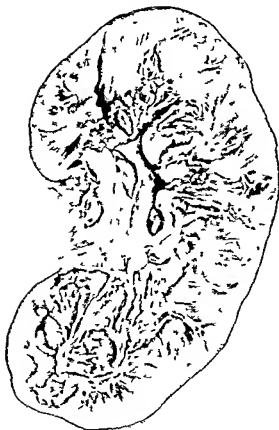


Fig. 148—Section of tuberculous kidney removed in Case 1 showing early stages of the disease. Note the eroded, ragged appearance of the papillae and minor calices. This is most marked in the upper half of the kidney. The primary tuberculous focus is usually located in the niche where the mucous membrane of the pelvis is reflected upon the surface of a papilla.

follow tuberculosis of the upper urinary tract. There can no longer be any question that tuberculosis of the epididymis is the primary form of involvement of the genital tract in the male.

the patient from falling forward while in this lateral position I employ a special rest which I have devised for supporting the thigh and leg of the diseased or uppermost side so that the patient is kept absolutely fixed in the lateral position

The incision which I prefer (Fig 149) extends from the costo vertebral angle in an oblique manner downward and forward to

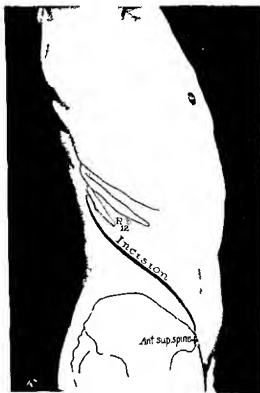


Fig 149 Location of incision in Case II (See text)

a point about 1 inch above the anterior superior spine of the ilium. The abdominal muscles are divided at right angles to their fibers care being taken not to injure the ilio inguinal and iliohypogastric nerves which are found in the muscular tissues above and below the line of incision. As soon as the lumbar

sided renal tuberculosis but the next question was Were both kidneys affected and how could we ascertain this in the presence of a suprapubic fistula which seemed at first thought to exclude a cystoscopic examination and ureteral catheterization? If we could only find one kidney involved nephrectomy offered the best prospect of relieving this most distressing condition. Thanks to the use of a cystoscope which permitted continuous irrigation of the bladder while a sponge temporarily closed the suprapubic opening I was able to secure a brief view of a normal left ureteral orifice and to insert a catheter into the ureter of this side no attempt being made to catheterize the diseased side. The urine obtained was clear contained no pus blood albumin or tubercle bacilli and phthalein injected intravenously appeared within five minutes. It was impossible to estimate the percentage of phthalein excreted within the first two hours from the left kidney owing to the fact that the cystoscopic examination could only be done after a general anesthetic had been administered as the bladder changes due to long-standing tuberculous involvement prevented the introduction of a cystoscope under ordinary conditions. I can warmly recommend the use of a cystoscope which permits continuous irrigation of the bladder in cases where the discharge of either blood or pus from the kidney constantly obscures the field of vision.

Having decided that the left kidney was capable of doing the work of both if the right one were removed I will now proceed to perform nephrectomy on the right side. The removal of the epididymus will be postponed until the suprapubic opening has healed so that the operation can be performed in a clean field.

Operation.—In operations upon the kidney and lumbar portion of the ureter there are two positions in which the patient can be placed. Some operators prefer to use the prone position. Other operators (and I belong to this group) prefer to place the patient in a lateral position with a pillow or a special kidney elevator which is attached to all modern instrument tables under the ilio-costal space of the sound side so as to widen as much as possible the space between the last rib and the crest of the ilium upon the side to be operated upon. In order to prevent

the patient from falling forward while in this lateral position I employ a special rest which I have devised for supporting the thigh and leg of the diseased or uppermost side so that the patient is kept absolutely fixed in the lateral position.

The incision which I prefer (Fig 149) extends from the costo vertebral angle in an oblique manner downward and forward to

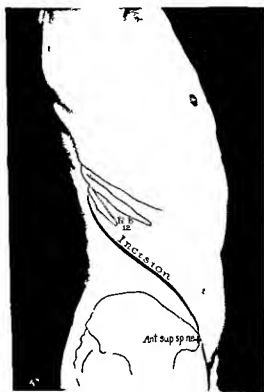


Fig 149 Location of incision in Case II (See text)

a point about 1 inch above the anterior superior spine of the ilium. The abdominal muscles are divided at right angles to their fibers care being taken not to injure the ilio inguinal and iliohypogastric nerves which are found in the muscular tissues above and below the line of incision. As soon as the lumbar

fascia is exposed it is incised and the perinephritic fat exposed. A few surgeons prefer a muscle splitting incision but although ideal in respect to lesser danger of hernia following the operation the poor exposure obtained does not offset in my opinion this advantage. I would like to emphasize, in this connection the necessity of being able to see every portion of the operative field in a kidney operation. Anomalous veins and arteries occur so frequently and adhesions are apt to be found so dense that a small field greatly prolongs the length of operation and increases its dangers.

In our patient we are confronted with a fistula following the former nephrectomy. These cases offer a far more difficult problem than where no previous operation has been performed. I prefer in such a case not to carry the incision through the fistulous opening itself but to follow the same principle which is employed in operations for intestinal fistulae, namely to expose the tissues on either side of the fistulous tract because one is less apt to find such dense adhesions. Having followed this plan you will now see the exposed kidney which is greatly enlarged and very firmly adherent to the abdominal wall in the vicinity of the fistula as well as to the ascending colon lying immediately in front of it (Fig. 150). Having found a line of cleavage between the kidney and the colon we will now proceed to separate the two viscera by employing blunt pointed curved scissors and spreading the blades. Adhesions of the kidney to the peritoneum and colon are among the most formidable difficulties which one encounters in nephrectomy. They are found especially in cases where long continued infection exists with much involvement of the perinephritic capsule and immediately adjacent tissues.

Having succeeded in separating the colon from the kidney without opening the peritoneal cavity (Fig. 150 B) a fairly large gauze pad is placed upon the bowel and the latter held aside with a deep retractor. Great care needs to be exercised to protect the bowel and peritoneum from the edges of a retractor in the hands of an overzealous assistant.

The next step in the operation is to isolate the ureter. It is not difficult to identify the ureter in cases of tuberculosis of

the kidney. As a rule, the ureter is much thicker than normal, and may reach the size of the adult index-finger. You can now

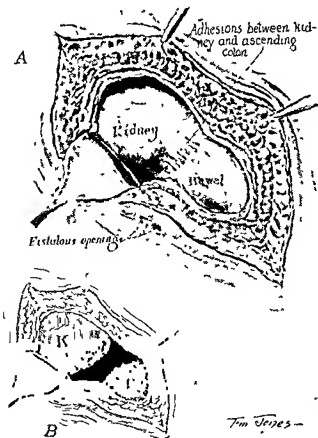


Fig. 150—View of operative field. A, Appearance of wound in Case II before separation of adhesions between the kidney and ascending colon. Note fistulous openings along lower margin of wound. (See text.) B, Kidney separated from colon without opening peritoneum or injury to bowel.

see the ureter exposed at the lower angle of the incision. In order to keep it in position I suspend it upon a traction loop of catgut (Fig. 151). The question arises at this step of the opera-

tion as to the care of the ureter and how much of it should be removed. Some surgeons advise removal of all of the accessible portion through the original nephrectomy incision, others make

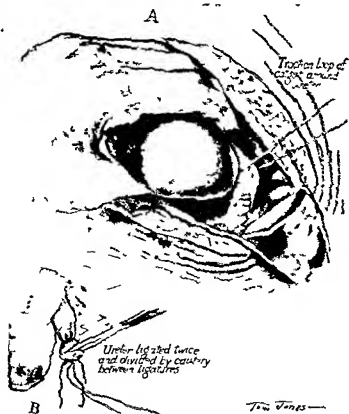


FIG 131-4 Greatly thickened ureter isolated and brought into view by traction loop of catgut. The great advantage of division of the ureter before any attempt is made to mobilize the kidney is pointed out in the text. B Ureter being divided between catgut ligatures with cauter.

a separate inguinal incision pull out the ureter through this second incision after it has been divided close to the kidney and then amputate as close to the bladder as possible. This totals

ureterectomy has never been employed much. It increases the mortality and does not prevent postoperative fistulæ. I believe that the majority of operators today follow the plan which I shall demonstrate namely, divide the ureter with the knife or preferably with the cautery (Fig 151 B) after ligating the ureter close to the kidney. The distal end of the ureter will usually drain into the bladder and the primary focus in the kidney having been removed the ureter in the majority of cases will soon become transformed into a fibrous cord. It is very exceptional to be obliged at a later period to remove the distal portion of the ureter on account of the formation of a pus sac due to strictures which usually obliterate the lumen at the vesical end of the ureter. I believe that it is very important to divide the ureter as the first step in nephrectomy especially in these difficult cases with many adhesions. I am indebted to Dr. Kolischer for calling my attention to this fact *i. e.* that the kidney can be much more easily mobilized after the ureter has been divided. It is necessary of course to ligate the proximal end of the ureter in order to prevent the escape of the contents of the renal pelvis into the wound. The treatment of the distal end of the ureter varies somewhat according to the experience of the individual operator. Some like W. J. Mayo prefer to inject 15 to 20 drops of pure carbolic acid into the lumen before ligation others content themselves with simply cauterizing as much of the lumen as is accessible from the upper end. I believe that none of these methods present any advantages over the simple method of high cautery division between two chromic gut ligatures.

Having divided the ureter we will now proceed to deliver the kidney into the wound. At this stage it is necessary to call your attention to the presence of accessory polar vessels which occur in 1 out of 5 normal individuals. These arise in the case of lower polar vessels either directly from the aorta or from the common iliac artery or occasionally as a branch from the main renal artery to the kidney. You will observe how carefully I separate the tissues around the lower pole from the kidney itself. This does not require much additional time and one is well re-

warded in this search if a polar vessel is found. I have on several occasions observed almost fatal hemorrhages from overlooking such an accessory vessel. The lower pole having been found without polar vessels we will now proceed to look for similar accessory arteries at the upper pole. These as a rule arise either directly from the aorta or as a branch from the main renal artery before it enters the kidney. An inexperienced operator will often mistake these vessels for adhesions and divide or tear them and apply forceps blindly in the effort to control the bleeding. The resultant hemorrhage may be thought to be due to a tear of the main renal vessels and forceps be placed on these without checking the hemorrhage. The upper pole in our case having also been found free of accessory vessels our attention is next directed toward the structures of the renal pedicle itself. There is no difficulty as a rule in bringing these into plain view but in some cases the pedicle is so short that it is safer to employ the two-clamp method of W. J. Mayo. In our case we are fortunate in being able to bring the kidney well into the incision so that the vessels can be ligated *en masse* and also separately (Fig 152). It is necessary in this connection to remember that we may have from two to five separate renal arteries or veins. I prefer in a case like this where the kidney can be easily delivered to apply one ligature of kangaroo tendon around the pedicle *en masse* and then to transfix the pedicle distal to the *en masse* ligature with a second kangaroo tendon ligature. In order to prevent any accident I believe it is advisable to have an assistant steady the pedicle with a nephrectomy clamp loosely applied proximal to the ligatures before the pedicle is allowed to retract into the wound.

The kidney elevator will now be lowered as some of the veins may not bleed when under tension. You will note that we have been able to ligate the pedicle without any hemorrhage. In certain difficult cases where it is impossible to separate the true or fibrous capsule of the kidney from the fatty capsule owing to adhesions between these two structures I have employed the method of Federoff to which W. J. Mayo has called attention

This addition to subscapular nephrectomy renders the ligation of the pedicle extremely easy. The kidney having been drawn out of its capsule the latter is separated from the sinus of the kidney as it folds back over the pedicle. This allows the kidney

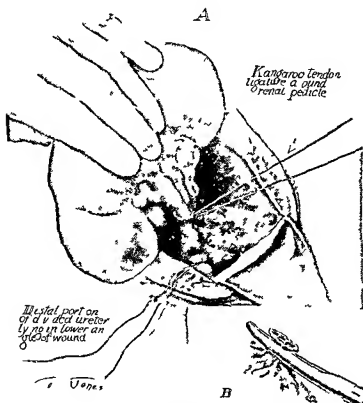


Fig. 153.—Ligat on *en masse* of renal pedicle with kangaroo tendon. (See text.)

with the renal vessels to be drawn through the capsule top and bottom by an incision through the capsule close to the pedicle. I believe it is important for every surgeon to be acquainted with this method and I can warmly recommend the study of Mayo's article.

The removal of the kidney having been completed (Fig 153), our next problem is how to take care of the ureteral stump, and whether or not to drain the wound. Some operators prefer,



Fig 153—Section of tuberculous kidney removed in Case II showing a little more advanced stage of tuberculous change than is shown in Fig 145

begun to invade the parenchyma. The presence of primary tubercles at the upper and lower poles indicates a diffuse spread of the tubercle bacilli to all portions of the kidney by way of the intrarenal lymphatics and blood vessels.

in case they have divided the ureter close to the kidney to allow the stump to drop back into the wound. I usually employ the technic of Rovsing, that is anchor the stump into the muscles

at the lower end of the incision (Fig 154, A) The incision is closed in layers with catgut and silkworm In order to prevent

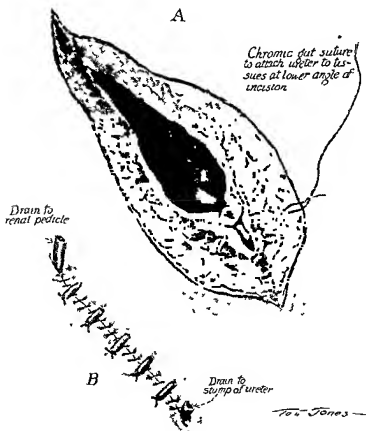


Fig 154—A, Stump of distal portion of ureter sutured to muscles at lower end of incision B, Appearance of incision before dressing is applied Note tension sutures tied through rubber tubing to prevent their cutting

the latter from cutting through I employ small sections of rubber tubing through which the silkworm loop is passed before being tied (Fig 154, B).

For a time it was customary to close the incision without drainage but I believe that the percentage of cases in which a sinus or abscess formed after such closure without drainage was so large (75 per cent.) that this method has been abandoned in favor of the insertion of a cigarette drain at the upper angle of the incision.

Postoperative Notes and Comment.—Following the operation the urine continued to discharge through the suprapubic n. tula for about two weeks. The urine which contained considerable pus gradually cleared up and the suprapubic n. tula opening was closed at the end of about four weeks at which time a right epididymectomy was performed and disclosed typical tuberculous of this structure. The boy's general condition improved greatly. The kidney wound was allowed to close after the drain had been removed on the tenth day following operation. The patient was discharged from the hospital greatly improved at the end of eight weeks.

This case illustrates the difficulties encountered in attempting to make a diagnosis of which side is involved or whether both kidneys are affected. The advanced tuberculous character in the bladder would have made a cystoscopic examination impossible without a general anesthetic even if the suprapubic n. tula had not existed. The value of employing a cystoscope permitting continuous irrigation of the bladder was very pronounced in this case. The presence of an apparently normal kidney on the left side showed that we were safe in removing the right kidney. The n. tula which led to the latter had not opened into a perinephritic abscess as was suspected by the surgeon who operated but into a tuberculous focus in the kidney itself. The futility of expectant measures such as the injection of bismuth paste which have been advocated in these cases. The coincident presence of a tuberculous epididymitis or its development after operation as in our first case is not at all a rare complication in tuberculosis of the upper urinary tract. Fink (1911) Wildbolz¹ in his monograph on tuberculosis of the kidney states that the most frequent localization of tuberculosis is an

¹ *Neue Deutsche Chirurgie* vol. 6, 1913

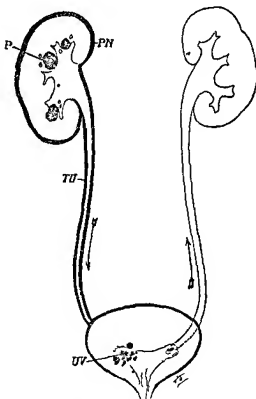


Fig 155—Diagrammatic representation of the course of the pathologic changes in tuberculosis of the kidney. The process begins as a rule, as a papillitis (*P*) well shown in Figs 147 and 153. The invasion of the parenchyma takes place through the lymphatics and through the blood vessels of the kidney, and from here toward the perinephritic capsule (*PN*), which may be the seat of extensive tuberculous abscesses or of a thickening similar to that seen in the pleura in chronic empyema. The spread of the tuberculous process in a downward direction takes place along the mucous membrane of the renal pelvis and ureter, as indicated by the direction of the arrow. The ureter may either be greatly thickened or very much dilated. The bladder changes are most marked in the immediate vicinity of the ureteral orifice (*UV*) of the first involved side. The entire bladder soon becomes invaded and the tubercle bacilli, as a rule, find their way along the lymphatics of the other ureter to the kidney of the opposite side, in an ascending direction, as indicated by the arrow on the left side.

accompaniment or postoperative complication of tuberculosis of the kidney is in the prostate or in the epididymis, less frequently, in the seminal vesicles. Tuberculosis of the female genitalia is rarely associated with tuberculosis of the urinary organs. Rafin found, in 53 per cent. of his male patients, that there were tuberculous foci in the genitalia which could be diagnosed clinically in addition to the renal tuberculosis. Suter found such a complication in 57 per cent. and Wildbolz in 71 per cent. Crabtree¹ in 70 cases found that tuberculous epididymitis developed after nephrectomy in 5 cases and tuberculosis of the prostate and seminal vesicles in 2. Altogether, 32.3 per cent. of all male patients developed tuberculosis of the epididymis either on the same or the opposite side, or bilaterally, before or after operation. I lay emphasis upon this complication because in both of the cases which I have just presented to you this complication was present, and I have observed it in about the same proportion in my male patients as is shown in the statistics of Crabtree. In the first case demonstrated today clinical tuberculous epididymitis evidently developed after the operation but in our second case it probably occurred as a focus concomitant with the one in the kidney.

The end results as given in the statistics of Israel, Crahtree, Wildbolz, Braasch and others, based upon a very large number of cases certainly justify removal of the involved kidney in cases of tuberculosis. The percentage of cases in which complete recovery occurs is about 60 to 75 per cent. The early mortality—that is those which die within the first six months—is 12.9 per cent. Of the late deaths—*i. e.* after six months—about 45 per cent. are due to pulmonary tuberculosis, 33.9 per cent. to tuberculosis of the opposite kidney and 14 per cent. to miliary tuberculosis. It is of great interest to note that tuberculous meningitis is a frequent cause of death in the late cases. The bladder symptoms are the slowest in disappearing and it requires from six months to two years for these to subside. Among the most careful analyses of end results are those of Braasch, Crabtree, Lower, Israel, and Wildbolz and I would urge you to

¹Surg. Gynec. and Obstet. vol. 21, 669, 1915.

study these articles if you desire to have an endorsement of the necessity of early diagnosis and nephrectomy. The contraindications to operation are advanced lung tuberculosis, multiple bone and joint lesions, prostatic abscess with perineal fistula, peritonitis, advanced bilateral involvement of the kidneys and inability of the opposite kidney to perform the function of both.

Tuberculin and other forms of expectant treatment are only indicated when one of the above contraindications are present. In bilateral involvement the diagnosis can be made only (when cystoscopy and ureteral catheterization are impossible) by exposure of both ureters. If there is only slight involvement of the opposite kidney, this one has a much better chance to heal if the focus of infection in the more involved one has been removed. As a rule, however, nephrectomy is seldom of any benefit in bilateral disease. In 62 cases of this kind collected by Israel, 42 had died within a few months after the operation; in 3 surviving cases there was an interval of seven, eight, and sixteen years respectively after the operation. But there is no proof, according to Israel, as to whether in these cases the opposite kidney was really involved or not. In a recent publication by Legueu, in 58 bilateral cases, 34 died in from six months to seven years, and 22 were living eight years after operation.

This entire question of tuberculosis of the kidney is one of the most important with which we have to deal at the present time in urologic surgery, and I cannot urge you too strongly to acquaint yourselves with every phase of the subject.

CLINIC OF DR. GATEWOOD

PRESBYTERIAN HOSPITAL

STRANGULATED OVARIAN CYST

Summary Differential diagnosis of strangulated ovarian cyst. Operative findings in present case. Origin of cysts in the ovarian region.

THE patient I shall show you first this morning entered the hospital during the night. She is a single woman, forty-two years of age, and a nurse. About six months ago I saw her when she was just recovering from an attack somewhat similar to the one which brought her into the hospital last night. At that time she told me that she had been troubled for about fifteen years with recurrent attacks of pain in the right lower quadrant of the abdomen, coming at varying intervals of six months to two years. In the first attack, fifteen years ago, there was considerable rise in temperature and also marked nausea and vomiting. Most of the attacks since then have not been accompanied by vomiting, although in each attack there was considerable distention of the abdomen, which was relieved by the passage of gas or by a bowel movement. Most of the attacks have lasted only a day or two, although the first one lasted several days.

As there was no definite tenderness at the time I first saw her and I had nothing except her history to aid me in making a diagnosis, I thought the most probable lesion was an infected appendix, perhaps with some foreign body acting in a manner similar to that of a gall stone impacting the cystic duct. I advised operation at her convenience, but, as is usual with such patients, this was postponed indefinitely.

She now has a temperature of 99.6° F. and a leukocytosis of 11,400. She has not been able to sleep during the night and complains of a good deal of pain. This attack began three days

ago when she was seized rather suddenly with a dull, aching pain in the right lower quadrant of the abdomen. This was followed by two stools without catharsis and the patient felt somewhat relieved. The following day the pain became generalized over the abdomen and for the first time was cramp-like in character. Several enemas were taken and expelled with considerable gas, and the patient was invariably relieved for short periods of time. The pain however continued to return and was very severe throughout most of yesterday. Examination of the abdomen shows as you can see a very rigid belly particularly over the right side. There is no great tenderness over the upper abdomen. I cannot palpate the sigmoid as the patient is moderately obese but there is no very marked tenderness over it. Most of the tenderness is low down on the right side. Vaginal examination cannot be made without an anesthetic, as the patient is a virgin. Rectal examination reveals considerable tenderness in the culdesac, but I am unable to definitely outline any mass. Physical examination is otherwise negative.

This is the second case I have seen within ten days complaining of pain in the right lower quadrant of the abdomen with tenderness relatively low down. I know of no condition more difficult to diagnose accurately than the one with which we are confronted. One naturally thinks of acute appendicitis with the offending organ lying over the pelvic brim or within the pelvis. In the preceding case the patient was just recovering from an attack of acute tonsillitis which might have served as a source of infection for either acute appendicitis or acute salpingitis of streptococcal type. This patient has had no sore throat and there is no reason to suspect a neisserian infection. The fact that the tenderness is confined definitely to the right side speaks against a gonorrheal salpingitis. Because there is a history of a number of attacks it seems likely that she has some chronic lesion and yet the patient maintains that the pain is more severe more steady and rather different than at any previous time. Whenever possible in medicine it is well to make one pathologic condition fit a symptom-complex but there are several things about the present attack which do not fit a diagnosis of

appendicitis In the first place when a patient has a sudden severe pain in the lower abdomen one should be a little guarded in making a diagnosis of appendicitis According to this history there were some cramp like pains but they did not occur until the patient had been ill for nearly twenty four hours Appendi

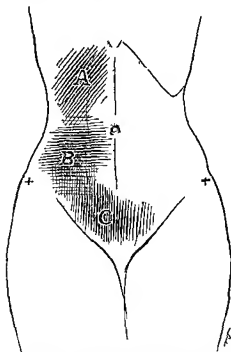


Fig 156—Diagram to show points of most marked tenderness in acute right-sided abdominal conditions A gall bladder B appendix C strangulated ovarian cyst

citis as a rule begins with cramps and *diffuse* not localized pain

One rather valuable guide in diagnosing acute abdominal lesions is to ask the patient to take one finger and find the point of greatest tenderness (Fig 156) I have frequently varied my incision according to the location of this point and usually have found the pathology directly beneath the designated point This

ago when she was seized rather suddenly with a dull, aching pain in the right lower quadrant of the abdomen. This was followed by two stools without catharsis and the patient felt somewhat relieved. The following day the pain became generalized over the abdomen and for the first time was cramp-like in character. Several enemas were taken and expelled with considerable gas, and the patient was invariably relieved for short periods of time. The pain, however, continued to return and was very severe throughout most of yesterday. Examination of the abdomen shows as you can see a very rigid belly, particularly over the right side. There is no great tenderness over the upper abdomen. I cannot palpate the sigmoid as the patient is moderately obese but there is no very marked tenderness over it. Most of the tenderness is low down on the right side. Vaginal examination cannot be made without an anesthetic, as the patient is a virgin. Rectal examination reveals considerable tenderness in the culdesac, but I am unable to definitely outline any mass. Physical examination is otherwise negative.

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opposite side before closing as bilateral cysts are not at all uncommon and even simultaneous strangulation of both sides has been reported. The left ovary is normal. As no pus has been encountered and there has been no leakage I shall close the abdomen without drainage.

Had this patient complained of an acute steady severe pain with no preceding history there would have been little difficulty in making a diagnosis of strangulated cyst. A peduncu-



Fig. 157—Specimen as it appeared immediately after removal. Note flattened adherent ovary and tube and twisted pedicle.

lated fibroid may give much the same picture but I did not seriously consider it here because I felt that in a woman of her age I should have obtained some clue from her menstrual history and from rectal examination. Had I made a vaginal examination or even a rectal after the patient was asleep I believe I should have been able to feel the tumor although it is very soft. Incidentally I might have ruptured it although this accident is much rarer than one might suppose.

patient places her finger on the point of most marked tenderness over the lower part of the right rectus (Fig 156 C)

Taking all these facts into consideration and then considering in addition that the leukocyte count is relatively low for so much pain and tenderness and that vomiting has been relatively in the background I am inclined to believe that we may have to deal with a strangulated ovarian cyst in spite of the past history I should probably give this diagnosis much less consideration had I not found an ovarian cyst which had been strangulated for almost three days in the case previously mentioned In that instance I made the preoperative diagnosis of acute pelvic appendicitis although rectally I could feel what I took to be an abscess but which proved to be a cyst.

Owing to the uncertainty I am making a midline incision and as I open the peritoneal cavity I find a considerable amount of slightly turbid straw-colored fluid On bringing the appendix into view I find that it is bound down by firm adhesions and that it is red and inflamed. Whether this appendix can account for the trouble or not is a question One would not expect so much free fluid without more inflammation but it is certain that there has been some appendical trouble from the character of the adhesions and therefore I shall remove the appendix before exploring further This is done in the usual manner crushing the stump and then invaginating it with two rows of purse-string sutures the first of linen and the second of catgut.

Examining the pelvis I now find a soft globular mass about $2\frac{1}{2}$ inches (6 cm) in diameter It is evidently a gangrenous cyst of some sort. As the contents of such cysts are frequently highly infectious it is necessary before proceeding further to see that the rest of the abdomen is well walled off I will have the head of the table lowered a little more before attempting to deliver the tumor It is not adherent to any surrounding structures so that removal is very readily accomplished I am transfixing the broad ligament close to the uterus with a ligature carrier armed with moderately heavy catgut and will tie both sides and remove the cyst. It is very easy to cover the raw surface with a running catgut suture It is important that I examine the

CLINIC OF DR EDWARD LYMAN CORNELL

CHICAGO LYING IN HO-PITAL

ECTOPIC PREGNANCY

Summary Diagnosis and treatment of ectopic gestation

I PRESENT for your consideration this morning a patient who was first seen last night at 5 30 P M She took a nap yesterday afternoon At 4 30 P M she was awakened suddenly by a severe and sharp pain in the lower abdomen on the left side She arose and went across the hall to her neighbor who remarked how pale she looked The neighbor called me In the meantime the patient took an enema which relieved the pain somewhat

I will outline briefly the history of this patient as far as it is of interest in this case She was delivered normally two years ago by me She has had no previous illness of consequence She denies venereal disease as does also the husband She is twenty six years old

Her last regular period was in July 1919 She missed in August In September she passed some clots with considerable pain I was not called at that time In October she missed her period again November 1st she began to flow some and has continued to up to the present time

When I first saw her yesterday she looked pale Her pulse was not rapid There was rigidity in the lower left abdomen and considerable tenderness Vaginal examination gently and carefully made revealed a large tumor mass in the left fornix

I urged her to go to the hospital for immediate operation but she could not go until late at night Preparations were made accordingly for 8 o'clock this morning As a complete examination was not made at the home I am going to examine her vaginally under anesthesia before opening the abdomen

Let us now examine the specimen. It consists of a thin walled bluish black cyst over the surface of which is spread a small much flattened ovary. Attached to it is the right tube which is gangrenous and swollen. The pedicle has been twisted two and one half times on its axis (Fig. 134).

Theoretically cysts in this region may arise (1) from the follicles of the ovary (2) from the corpus luteum (3) from the germinal epithelium (4) from remains of extra ovarian tissues as Wolffian or tubal rests or from remnants of paroophoron and (5) they may be mere retention cysts originating in the follicles or corpora lutea.

Practically the origin of this cyst is very definite. Retention cysts are almost always small and multiple. Parovarian cysts and others occurring from rests are found in the broad ligament. They grow downward into the pelvis and therefore are much less likely to strangulate. This is a simple cystoma originating within the ovary from the epithelium of a follicle or from the corpus luteum. On section there is no evidence of papillary proliferation and therefore none of malignancy although careful microscopic examination will be made of the cyst wall.

I believe that this patient has had recurrent attacks of appendicitis but I feel that the present condition has occurred entirely independently of the appendix pathology even though the appendix is reddened and somewhat injected.

mass of blood just distended it. Near the middle of the tube we note another rupture, an extracapsular rupture which undoubtedly began yesterday evening. There is a rather large artery here. If this artery had been bleeding all night as rapidly as it was before the clamp was applied, the patient would have been exsanguinated. The vaginal examination undoubtedly caused it to rupture. You can readily see how friable the tissues

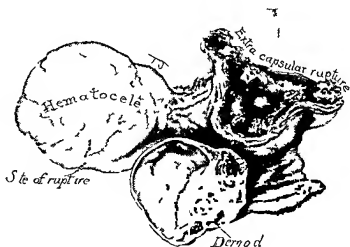


Fig 158 The outer end of tube distended by blood due to a previous extracapsular rupture. Dotted line shows here rupture took place on examination. Extracapsular rupture caused the abdominal hemorrhage. Note small dermoid in the ovary.

are. Just a touch of the gloved finger in the ruptured area causes the capsule to tear.

The ovary on this side contains two small cysts. It is also firmly bound to the tube in several places. There are many adhesions freshly made between the tube, ovary, and uterus. It is almost impossible to separate the tube from the ovary. If it were done in this case one could not be certain to control all the bleeding or to save the ovarian circulation. Hence it is best to remove the tube and ovary together.

There is a tumor mass on the left side. It has grown in size since last evening. Do not be rough in these examinations especially in the home as the tumor may rupture. You will note I am using very light palpation yet I have ruptured the sac. We will open the abdomen immediately. Notice that the patient has become pale. The anesthetist is a little anxious as the pulse has increased suddenly. Had this accident happened in the home last night it would have been a very serious question. This patient can bleed very rapidly especially if a large artery is ruptured. To go back to the mass felt in the abdomen. It was about the size of a large grape fruit. It was located probably in the tube as it seemed to be connected to the uterus by a narrowed isthmus. The ovary on the right side is larger than normal. It may have a corpus luteum cyst. The body of the uterus is soft and about the size of a two months pregnancy. The cervix is patulous and soft. There is a bloody vaginal discharge but no clot. This is a case of ruptured ectopic pregnancy.

We are now ready to open the abdomen (five minutes later). A median incision is made from the pubis to within 4 cm. of the umbilicus. The rectus muscle on the left side is retracted from the median line to the left. As we reach the peritoneum we note it has a dark bluish color. This indicates blood in the abdomen. On cutting through the peritoneum liquid blood exudes. The diagnosis is correct. The peritoneum is slit to the pubis using care not to cut into the bladder. The left tube is brought up into the wound and an 8 inch clamp is fastened at an angle with the tube and the uterus in order to control the bleeding coming from this large artery near the point of rupture of the ectopic pregnancy.

On examining this tube it is noticed that there were two types of rupture—one intracapsular and one extracapsular (Fig 158). The intracapsular rupture occurred at the fimbriated end of the tube probably some time ago. The vaginal examination made a few minutes ago caused the rupture you note in the thin capsule. This was an attempt by nature to produce a tubal abortion. The fimbriated end of the tube was closed so the

of abdominal pain for two days after which she was quite comfortable. She was discharged from the hospital November 23 1919. She returned for her final examination January 9 1920. She was in good health had gained 8 pounds in weight and looked splendidly. The results of abdominal and vaginal examination were satisfactory. She has had no symptoms of the menopause.

We will examine the specimens grossly. The left tube has the two ruptures already noted. No trace of the fetus is seen.

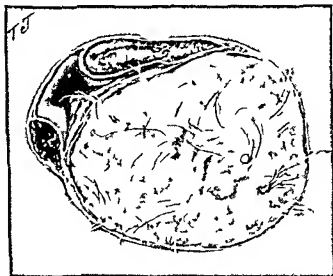


Fig. 159. Dermoid cyst opposite ovary from same patient as Fig. 158.

The tubal sac is quite thin. On holding it up to the light one sees through it readily. The left ovary, on splitting, shows two rather large cysts which contain a bloody mucous fluid. Near the bottom of the ovary we find a small cyst the size of a pea which contains a lemon-colored granular substance. On examining this material closely we find a small hair. This is a dermoid cyst just beginning. The right ovary is interesting. It too contains a dermoid (Fig. 159). Here we see material exactly like that seen in the small cyst in the left ovary. Many hairs

With scissors we cut away the tube and ovary along the side of the clamp. Another clamp is placed at the end of the first one to control bleeding from the outer end of the tube. In order to control the tubal and ovarian arteries we pass No. 2 twenty-day chromic catgut around the clamps in a running suture. The clamps are removed slowly and the suture drawn taut and tied securely. The raw edges are sewed over to prevent adhesion.

This concludes the work on this portion. The right ovary is now brought up. It is large—about the size of a large lemon. It has a cystic appearance, yet it feels a little too firm for a simple cyst. On looking it over we find very little apparently normal ovarian tissue. Here is a girl twenty-six years old. What shall we do? We ought to leave some ovarian tissue if possible, yet this ovary is not worth saving. It probably contains a dermoid cyst. We will remove it in spite of the fact that we dislike to cause premature menopause. We clamp the ovarian pedicle and cut it with scissors. The raw surface and ovarian artery are caught in a running suture similar to that used on the opposite side.

The appendix is inspected. It is larger in diameter than usual, somewhat injected, and has a few adhesions. We remove it in the usual manner by clamping the mesentery, passing a purse-string suture of linen, and cutting the appendix off after tying the lumen with catgut. The stump is treated with phenol and alcohol and buried. The mesenteric bleeding is controlled with catgut sutures.

The abdomen contains some blood which is not clotted. That which is easily accessible is removed, but no great effort is made to clean the abdominal cavity. We have seen no harm result from leaving blood.

The peritoneum, fascia, fat, and skin are closed in the usual manner adopted in this clinic. 1000 c.c. of normal salt solution are now injected under the breasts. The patient's pulse is 120, but good quality. She does not look quite as pale as she did. The normal salt solution will help to replace some of the lost blood volume. You notice it is readily absorbed.

Note—This patient made a good recovery. She complained

pain had been more or less continuous in the upper abdomen. It was girdle-like in character and localized in the median line. It was present at all times and bore no relation to meals. She belched much gas and had a sour taste in the mouth. She had a poor appetite. The day before admission she had a severe attack of abdominal pain and grew pale.

For the first time (two hours before operation May 1st) a mass was felt in the left abdomen near the umbilicus. It was dull on percussion. The blood count in the morning was: reds 2 020 000, whites 9800, hemoglobin 80 per cent. In the afternoon reds 1 880 000, whites 12 800, hemoglobin 60 to 70 per cent.

At operation the left tube was found adherent to the omentum at the level of the umbilicus. The tube had ruptured but had not discharged the fetal contents. The abdomen contained about 1 quart of blood. The tube and ovary were removed.

Most text books do not give enough attention to the diagnosis of ectopic pregnancy before rupture. I believe we would recognize more cases if we constantly bore the condition in mind. Most uterine hemorrhages after missing a period are considered as threatened abortions and treated as such without examinations being made. This is a mistake. Each patient should be carefully and gently examined internally. The cervix should be inspected to determine whether the bleeding is extra- or intra-uterine. It is only in this way that abortion and that rather rare condition, angular pregnancy, are differentiated. I nearly operated a case of angular pregnancy for ectopic several years ago.

In angular pregnancy the history is that of a normal pregnancy until the third or fourth month. At that time there may be a gradual onset of pain with uterine hemorrhage which shortly (usually in forty-eight hours) ends in a true abortion. No anemia occurs. Upon vaginal examination the tubes and ovaries can almost always be palpated. The portion of the uterus involved in the pregnancy contracts and one can then outline the entire uterus. The body of the uterus and the angular pregnancy can be moved both at the same time. If the preg-

are also seen. In the center is a mass of white tissue. This is an attempt at skin formation probably as we see many hairs attached to it.

De Lee states that when any woman in the reproductive period runs over her usual time or has *some irregularity in her menses* either a small amount or more profuse has cramp-like pain in the lower abdomen mostly unilateral with irregular uterine hemorrhage one should think of ectopic pregnancy. In this I agree.

The diagnosis of unruptured ectopic pregnancy is exceedingly difficult especially in the early months. The tube unless placed most favorably in the cul-de-sac is hardly distinguishable from the intestine. Many times adhesion forms between it and other organs such as the omentum, cecum, sigmoid etc. which pull the tube out of the pelvis when the patient lies in the dorsal position.

Just such a case puzzled several of us a few months ago. Briefly the history is as follows:

Mrs. J. S. age twenty-five had her last regular period January 28, 1919. She presented herself for examination March 1, 1919. She missed the February period. On March 14th she began to flow for one day and then spotted every day. The breasts were painful. She had no particular pain in the abdomen but she had indigestion with eructation of gas. On the 18th and 19th she flowed considerably and passed some clot. The cervix was soft and patulous. She was put in the hospital and curetted. A diagnosis of mole was made. On April 7, 1919 she returned with cramping pain throughout the abdomen. She could not walk or sit comfortably. She was better when in bed. She was not constipated. She complained of indigestion and gas on the stomach. Vaginal examination was negative except the uterus was slightly larger than normal. No masses were palpable in the abdomen. I sent her to an internist thinking she had a gastric condition as most of the tenderness was above the umbilicus. He placed her on a diet and mild eliminant.

She did not improve. On April 30th she reported at the hospital complaining of cramping pain in the epigastrium. The

further complication. Usually however the tube ruptures sooner or later so that it resembles the extracapsular form.

Tubal abortion is the simplest form of ending ectopic pregnancy. Many of these cases are undiagnosed. Undoubtedly this happens many times without bad effect on the mother. Hemorrhage occurs at the placental site loosening the fetus. It is protruded toward the fimbriated end. The tube behind becomes more or less distended. The bag of waters may rupture expelling the fetus either externally or into the blood clots. Gradually the tube contents are forced out into the peritoneal cavity where absorption takes place.

When the rupture occurs in the broad ligament the fetus may or may not die. It may escape into the broad ligament and continue to develop or into the peritoneal cavity. Usually the folds of the broad ligament are separated and a hematoma is formed.

Occasionally the fetus escapes and lives. It forms new attachments and continues to develop. This condition is known as secondary abdominal pregnancy. The omentum, intestines, uterus, bladder and other organs are matted more or less firmly around the fetus. This presents a formidable problem at operation. Many cases of full term deliveries are reported in the literature. The placental site and the sac present a big problem in their handling. The blood vessels are so numerous and their walls so thin that hemostasis is difficult. Before the abdominal delivery the sac may rupture and the fetus be expelled into the abdominal cavity. The fetus dies. Absorption cannot take place. The fetus becomes calcified or mummified.

In ectopic pregnancy certain changes occur in the uterus. The cause of this is not known. It hypertrophies, decidua forms, it softens and takes on the characteristics of a pregnant uterus. It rarely increases in size larger than a three months pregnant uterus.

From what I have said you can appreciate the fact that we are dealing with a very serious condition offering great danger to life. Extreme care must be given to the diagnosis.

nancy continues in spite of the slight uterine hemorrhages, the body gradually assumes the typical shape of the normally pregnant uterus.

The etiology of ectopic pregnancy is clouded. Several causes have been advanced. Among them may be mentioned salpingitis peritonitis with adhesions, infantile tubes, accessory tubes and diseases of ovaries. Salpingitis is mentioned first, as it is a frequent forerunner. It is usually due to gonorrhea but may follow puerperal infection or appendicitis, either acute or chronic. The tube may be occluded in any portion, either internally or externally, from adhesions.

The ovum implants itself in the tube in the same manner as it does in the uterus. As it grows the tube thins out and endeavors to keep pace with the growing ovum. Decidua is formed more or less and soon the ovum closes the lumen of the tube. The villi bore into the blood vessels. The latter increase in number and size. The tube is gradually distended to the point of rupture, the weak spot being located at the placental site.

The tube may rupture in any one of several ways depending upon the location of the placenta and somewhat upon trauma. It may rupture (1) through the capsule of the tube into the peritoneal cavity, extracapsular, (2) the rupture may take place within the tube, the muscular layer separating, intracapsular, (3) it may protrude through the fimbriated end of the tube, tubal abortion, or (4) it may rupture into the broad ligament forming a hematoma.

In the former case, or extracapsular rupture, the tube does not empty itself usually, only a portion of the ovum protrudes, but the bleeding may be severe. The pelvis fills with blood which clots. The peritoneum throws out fibrin. The omentum and intestines soon try to wall off the blood, forming what is known as a hematocele. This is the most dangerous form. In the intracapsular type the bleeding is confined, at least early, to the tube. The fimbriated end is occluded by clots and the tube becomes distended. More or less separation occurs at the placental site. This may be sufficient to cause death of the fetus, in which event absorption may eventually take place without

OVARIAN CYST SIMULATING ECTOPIC GESTATION

Summary A patient complaining of abdominal pain tenderness in the right lower quadrant and the general symptoms of early pregnancy associated with the discovery of a tender mass in the right adnexa differential diagnosis pathology disclosed by operation

THIS afternoon we present a case in which the diagnosis is somewhat puzzling. It is either an ectopic pregnancy or a cystic ovary on the right side. This patient presented herself first on December 20th. She gave the following history:

Married November 1918. At two months she had a criminal abortion performed apparently with no bad after result. In April 1919 she had another criminal abortion performed at the second month. Her periods were always two weeks late. The last period was November 8, 1919. It was regular in character. On December 14th she spotted for a few hours. On December 16th she spotted again and while in the bath room fainted. She stated that after fainting there was some pain in the lower abdomen more on the right side than the left. December 19th she spotted again and complained of pain on both sides of the lower abdomen. Her breasts were sore and somewhat enlarged. She was nauseated and vomited occasionally. On the morning of December 20th she vomited three or four times. She was tired all the time and had no appetite. Previous to this attack she had always been in good health not having had a physician since infancy. With her other pregnancies she had no trouble with nausea or vomiting.

Her mother died of heart disease. Her father 5 sisters and 2 brothers are living and well.

The menstrual period began at fourteen years of age six to seven days duration rather profuse and without pain.

Upon examination that day one noticed that the patient was thin and the skin dry and pale. The heart and lungs were negative. The blood pressure was 112 systolic and 72 diastolic.

OVARIAN CYST SIMULATING ECTOPIC GESTATION

Summary A patient complaining of abdominal pain tenderness in the right lower quadrant and the general symptoms of early pregnancy associated with the discovery of a tender mass in the right adnexa differential diagnosis pathology disclosed by operation

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nancy ovarian pregnancy and pregnancy in the broad ligament Normal pregnancy may be present complicated by acute or chronic appendicitis cystic ovary fibroid either simple or infected salpingitis and pelvic abscess

This patient has been in the hospital for six days during which time her temperature has been normal or slightly sub normal Her pulse ranges from 60 to 80 The blood pressure has remained low ranging from 108 to 112 systolic and 65 to 75 diastolic

Upon vaginal examination we find the perineum and vulva normal The cervix is high and situated somewhat forward It is softer than normal The os is closed There is no roughness The body of the uterus is felt anteriorly and to the left of the median line It contains a soft spot in the anterior portion Also it is larger than normal It is about the size of a two months pregnancy The left fornix is negative The ureter is not tender The ovary is felt and is normal in size The right fornix presents something abnormal There is a mass found which is about the size of a small orange It is extremely tender when the patient is awake It is soft and fluctuates The impulse is transmitted from the abdominal hand The right tube is felt running from the uterus but it seems to end in the mass In other words the mass seems to be at the outer third of the tube The ovary cannot be felt

In this case infection can be ruled out because the patient has had no temperature and the blood count is practically normal It is evident that the pain is due to the mass in the pelvis which is not infected That leaves the tumors A cystic ovary is not necessarily very tender An ectopic pregnancy in the tube or ovary is very tender A cystic ovary gives fluctuation such as this mass does but so will an ectopic pregnancy which is three months advanced provided it is as favorably situated as this mass is No ovary can be felt but the tube can be palpated near the uterine end The condition is either an unruptured ectopic tubal pregnancy or a cystic ovary

The abdomen is opened in the median line commencing about 3 cm from the umbilicus The incision is carried down about 8

The abdomen was distended. It was soft above the umbilicus and somewhat rigid below. There was more rigidity on the right side than on the left. McBurney's point was tender.

Upon vaginal examination it was noted that the neck of the cervix was softer than normal in proper position and closed. There were no erosions. On pushing the cervix up the patient complained of pain on the right side. The body of the uterus was larger than normal and somewhat soft, there being a soft spot on the anterior wall. The left ovary and tube were normal. In the right fornix was found a mass somewhat globular in shape about the size of a lemon. It was extremely tender and somewhat movable. Owing to the abdominal rigidity at the time of examination it was difficult to ascertain just what the mass was. The gloved hand on removal was tinged with a brown secretion. The patient was advised to remain in bed and given alkalies and corpus luteum tablets to control the vomiting. The temperature was 98° F and pulse 100.

On December 22d she came to the Chicago Lying in Hospital because of repeated vomiting and pain in abdomen. After three days here the vomiting ceased, the nausea remaining. Her color improved and she felt considerably stronger.

This morning (12/27/19) a vaginal examination was made and we found the mass on the right side had grown larger, quite tender and seemed to be located at the outer third of the right tube. The blood count showed 4 500 000 reds and 8900 whites with hemoglobin of 80 per cent. There was still tenderness over McBurney's point. The abdomen was not quite as rigid as it had been.

You will note from this history that the patient has missed one regular period and that she has spotted. She has vomited and has had pain in the lower abdomen. Her breasts are sore and she is nauseated. She has fainted.

I am going to examine this case vaginally under anesthesia but, before proceeding with the examination we should have some idea in mind as to what we will probably find. From these notes we would think of pregnancy either normal or ectopic. Under ectopic pregnancy there should be mentioned tubal preg-

ning catgut suture. The fascia is then closed with No. 2 plain catgut. As this patient is thin, the fat needs no reinforcement. The skin is closed with a continuous subcuticular silkworm gut suture. As we reach the center of the incision, the silkworm gut is brought to the surface and a second piece is tied loosely around it. It then re-enters the subcuticular tissues through the same

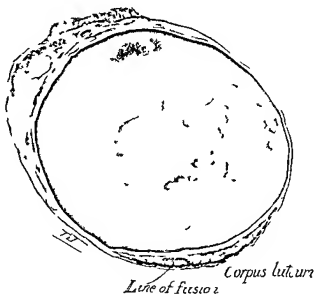


Fig. 160. Cystic ovary removed from pregnant woman. Note the corpus luteum which has been pushed outward and its contents absorbed. The ovary left in place contained no outward signs of corpus luteum.

opening and the suturing is continued. This leaves a fine hair-line scar. When the suture is removed, the small piece attached to the center of the buried silkworm gut is lifted out of its bed and the main suture cut in two. Then the suture is pulled out by the upper and lower strands.

No stay sutures are used. I have not placed a stay suture in over two years. As yet, no bad effect nor hernia has

cm The recti muscles are separated In this case the peritoneum is clear, showing there is no free blood in the abdominal cavity The peritoneum is cut and the hand inserted The uterus is found on the left side It is about the size of a two months pregnancy It looks and feels as if it were pregnant The left tube and ovary are normal in size and shape as you can see

The right tube and ovary are bound down by fine easily broken but extensive adhesions to the rectum and culdesac I am breaking them up in order to deliver the cystic ovary through the abdominal incision You will notice that the tube is adherent to the cyst at its outer third The ostium however is not closed

The tube and ovary on this side should be removed providing the tube is patent on the other side A probe passed down the left tube shows it to be patent throughout An 8-inch forceps is now passed behind the ovary and tube on the broad ligament Both organs are then cut off (Fig 160) A continuous No 2 twenty-day chromic catgut suture is then passed over the entire length of the cut broad ligament and the 8-inch forceps is gradually removed as the suture is being drawn taut Care must be taken that the ovarian artery is well secured The raw places in the peritoneum are then closed either with the same suture as I am doing or with interrupted sutures This finishes this part of the operation

The appendix is next inspected It is found to be twisted on its mesentery There are fine peritoneal adhesions around the appendix and mesentery The appendix contains two small fecal concretions near the outer end The organ is injected We will remove it after ligating the mesentery using the clamp phenol alcohol and purse-string suture method

The culdesac is again inspected for blood We find that there is considerable oozing from the broken adhesions Suturing will not control this so we pack it temporarily with hot lap sponges This controls the bleeding The incision in the abdomen is then closed in layers The peritoneum is closed with continuous No 1 twenty-day chromic catgut The muscle is brought to the median line and sutured there with a light run

the cavity of the cyst the lutein cells have undergone degenerative changes their nuclei are less distinct and their cytoplasm is vacuolated. Between the cells in this portion there are vacuoles and spaces many of which are larger than the cells themselves. The edge adjacent to the cavity is frayed irregular and ragged in appearance as if some of the cells had slipped loose into the fluid filled cavity and as if the fluid had infiltrated between the cells producing the vacuoles and spaces mentioned above.

The outer surface of the corpus luteum is covered with ovarian stroma in which there are a number of small corpora albicantia. From this stroma there dip into the corpus luteum numerous trabeculae of connective tissue. At various places in the substance of the yellow mass especially in that half toward the cavity of the cyst there are groups of fibroblasts and thin walled capillaries among the more or less degenerated cells. There are also small hemorrhages into this new formed connective tissue and a few phagocytic cells containing brown pigment granules are also present.

The thinner portion of the cyst wall contains no lutein cells. It is made up of ovarian stroma with an occasional corpus albicans and a few small compressed follicular cysts lined with flattened epithelium.

Summary—This is a cyst without epithelial lining. A part of its wall is composed of a flattened disk shaped corpus luteum which is in direct contact with the fluid contents of the cyst.

Diagnosis—Corpus luteum cyst of the ovary.

developed. In very fat women the fat is brought together either by interrupted or continuous No. 1 catgut placed near the skin.

Earlier I mentioned that tablets of *corpus luteum* were given to control vomiting. I have been using the 2 grain tablets for some time. In many cases they control the vomiting nicely. I start with one tablet after meals and at bedtime. The dose is gradually increased if one does not control until the patient is taking 16 a day. Usually 8 tablets a day are needed. This method of giving *corpus luteum* is not as effective perhaps as the hypodermic but I find it difficult for a patient to make daily trips to the office to obtain the injections. I have been compelled therefore to try the oral method. I feel that the majority of cases are helped. In many it works like a charm. In others very little effect is noticed. In some the vomiting is made worse even with the hypodermic method.

Occasionally we run across a case in which the vomiting seems to be reflex. The patient cannot keep food down. *Corpus luteum* either orally or hypodermically does not relieve. In such cases I have used successfully a pill containing cerium oxalate bismuth subnitrate and a small amount of cocaine (Squibb). Care should be used in prescribing this pill because of the cocaine in it.

REPORT ON EXAMINATION OF OVARIAN CYST

The wall of this cyst is composed grossly of two parts—one the thicker portion in which there is a flattened yellow disk shaped mass (*corpus luteum*) and making up about one fifth to one fourth of the greatest circumference of the cyst and second the remaining portion much thinner without any yellow tissue and composing about three fourths to four fifths of the greatest circumference of the cyst.

Upon microscopic examination the cyst is found to be entirely without an epithelial lining. In that portion in which the wall is thin the cavity is lined by the stroma of the ovary. In the thicker portion of the lining is the flattened *corpus luteum* itself. This disk shaped yellow mass contains in its outer portion a thin layer of typical lutein cells. In that portion adjacent to

CLINIC OF DR. FREDERICK G. DYAS

COOK COUNTY HOSPITAL

UMBILICAL HERNIA IN A BABY EIGHT HOURS OLD

Summary Management of strangulated umbilical hernia in an infant whisky sugar anesthesia Importance of search for coincident developmental anomalies in the presence of one discovered congenital defect

THE patient is a baby eight hours old who was brought to the hospital immediately after birth. Examination at that time showed the cord intimately adherent to an oval mass which protruded from the umbilicus. This mass enlarged with inspiration and when the baby cried. It was impossible to return the contents to the abdominal cavity. The whole mass was about the size of an apple. Upon examination it seemed to consist of congested masses of the small bowel to which about 10 inches of the cord was adherent. A diagnosis of congenital strangulated umbilical hernia was made and immediate operation advised. In every other respect the baby was apparently normal; the mother gave a history of having had several other children all of whom were normal.

Examination—The hernial mass arises from an apparent congenital defect in the abdominal wall at the umbilicus and emerges alongside and apparently superior to the attached cord (Fig. 161). The covering of the mass at one point is detached skin while most of the mass is covered only by a thin sac through which the coils of intestine may be seen with distended blood vessels on the serosa. On pressure over the sac the child cries. The cord is edematous and shows much excess of Wharton's jelly near the distal portion.

Operation—The anesthesia consists of a few drops of whisky on a lump of sugar held in a square of gauze. The baby is al-

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Operation—The anesthesia consists of a few drops of whisky on a lump of sugar held in a square of gauze. The baby is al

lowed to suck this and a small amount of whisky is added to the sugar from time to time. This produces a very safe and efficient anæsthesia in infants and causes no unpleasant after effects. The skin about the ring has been cleansed with soap and water.



FIG. 161.—Hernial sac attached to umbilical cord for a distance of 10 inches. Many coils of intestine can be seen and felt through the thin sac wall.

We are making a transverse incision over the hernial sac which we shall enlarge laterally to the limit of the hernial opening. The adhesions between the loop of the bowel and the peritoneum are separated and the small bleeding vessel ligated (FIG. 162 1). The hernial mass is now reduced. The edges of the hernial opening are freshened and the incision thoroughly

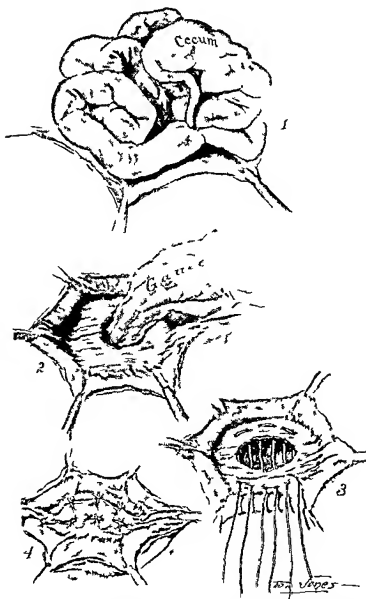


Fig 162 The sac was opened and the contents freed from adhesions (1) After reduction of the protruding bowel (2) the flaps of fascia above and below the hernial opening were approximated by mattress sutures (3 4)

directed above and below in order to provide sufficient tissue to imbricate the edges (Fig 16? 2). We are introducing three mattress sutures of chromicized catgut from below upward leaving a good margin for overlapping (Fig 16? 3). The upper flap is now sutured over the lower flap producing a strong union the line of suture running in a transverse direction as the direction of the strain is transverse. In the closure of abdominal wounds the greatest strength may be obtained by making the repair in such a manner that the direction of the strain and the suture line may be the same. The skin is closed with silkworm gut suture and the wound covered with a collodion dressing.

Subsequent History—The patient apparently did well for two days when vomiting began and continued until the child died. In spite of prolonged vomiting and crying there was no evidence of giving way of the closure of the abdominal wall. Postmortem examination showed a congenital atresia of the bowel in the neighborhood of the descending colon.

This case emphasizes the importance of looking for further congenital defects in a patient in whom some acute condition brings the original defect to notice. Frequently in congenital hernia there may be other anomalies of development as noted above. In the genito-urinary system hypospadias or cryptorchidism may indicate the presence of a horse-hoe kidney or a unilateral kidney.

INTESTINAL OBSTRUCTION

Summary A patient with symptoms of acute intestinal obstruction localized at the site of an abscess in an old laparotomy scar. Operative treatment—omission of peritoneal irrigation in the treatment of localized peritonitis. Postoperative history.

THE second patient we have for operation today is a single woman twenty-seven years of age who was brought to the hospital complaining of pain in the abdomen. On admission a diagnosis of intestinal obstruction was made.

Twenty-four hours before admission the patient was seized with acute abdominal pain, nausea and vomiting, inability to move the bowels and distention of the abdomen. The pain and distention have gradually grown worse until at the present time there is a mass on the right side of the abdomen in which peristaltic waves may be seen. The point at which these waves are arrested is at the site of an old laparotomy scar. There is redness and fluctuation at this point indicating the presence of pus in the tissues of the abdominal wall. There is great tenderness on palpation. The patient says that the previous operation was performed for intestinal perforation. The cause of the perforation, however, cannot be ascertained although the patient states that it was necessary to introduce drainage tubes and a purulent discharge continued for over a week. A diagnosis of intestinal obstruction due to old adhesions with an abscess of the abdominal wall is therefore made and the patient immediately prepared for operation.

Under ether anesthesia I shall make an incision parallel to the old scar in order to avoid the adhesions. On opening the abdomen I find dense adhesions upon the under surface of the old scar uniting the omentum and loops of ileum to the parietal peritoneum. On cutting through the abdominal wall a small amount of pus is encountered between the rectus and its posterior sheath. There are plaques of fibrinous exudate past

ing together the loops of bowel and there is a considerable amount of slightly purulent free fluid. In the lower portion of the ileum is a large diverticulum at the very apex of which is a ragged opening from which intestinal contents are pouring out (Fig 163). There is a considerable amount of formed feces in the peritoneal cavity opposite this opening. On either side of the

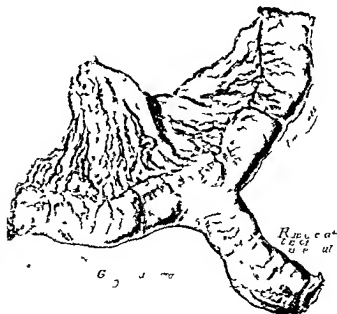


Fig 163—Specimen after removal. Note gangrenous area in bowel wall and ruptured diverticulum.

diverticulum there are patches of gangrene in the bowel wall for a distance of about 6 inches on either side. It will therefore be necessary to remove about 18 inches of ileum in order to make the anastomosis in healthy tissue. We shall do this in the usual way making an end-to-end anastomosis by the Connell suture method. We have sponged the fecal material from the abdominal cavity but no attempt has been made at irrigation.

as this would only serve to disseminate the infective material to the remotest areas of the peritoneum and to convert a more or less localized infection into a true generalized peritonitis. We are closing the incision down to the lower portion where we have inserted two drainage tubes one leading down to the anastomosis and the other to the lower part of the pelvis.

Subsequent History—The patient was put to bed in the Fowler position given proctoclysis and after twenty four hours a small amount of liquid by mouth. After forty eight hours she passed flatus and on the third day had a small movement with the aid of a low enema. She has made a complete recovery except for the infection of the abdominal wall which was present at the time of operation. Her temperature has at no time gone above 100°F and we believe this is due to the fact that the peritoneal cavity was not irrigated thereby not spreading the infective material over the whole serous surface.

